Molten Metal + Water = Hazard

Contract with Aluminum Industry Aims at Worker Safety

Improving safety for workers in the aluminum industry is the long-term goal of a research program begun last fall by Sandia for the Aluminum Association under an initial 18-month reimbursable contract. The program calls on Sandia expertise acquired during nuclear safety studies.

When molten metal and liquid water (not vapor) accidentally get together, it can be bad news — a fact known by metallurgists for a long time. The interactions range from mild "pops" that scatter droplets of molten metal to violent explosions — often called steam explosions — that injure workers and damage facilities. Unfortunately, water is near in each step involved in handling molten metals — reduction from the ore, remelting, alloying, and casting.

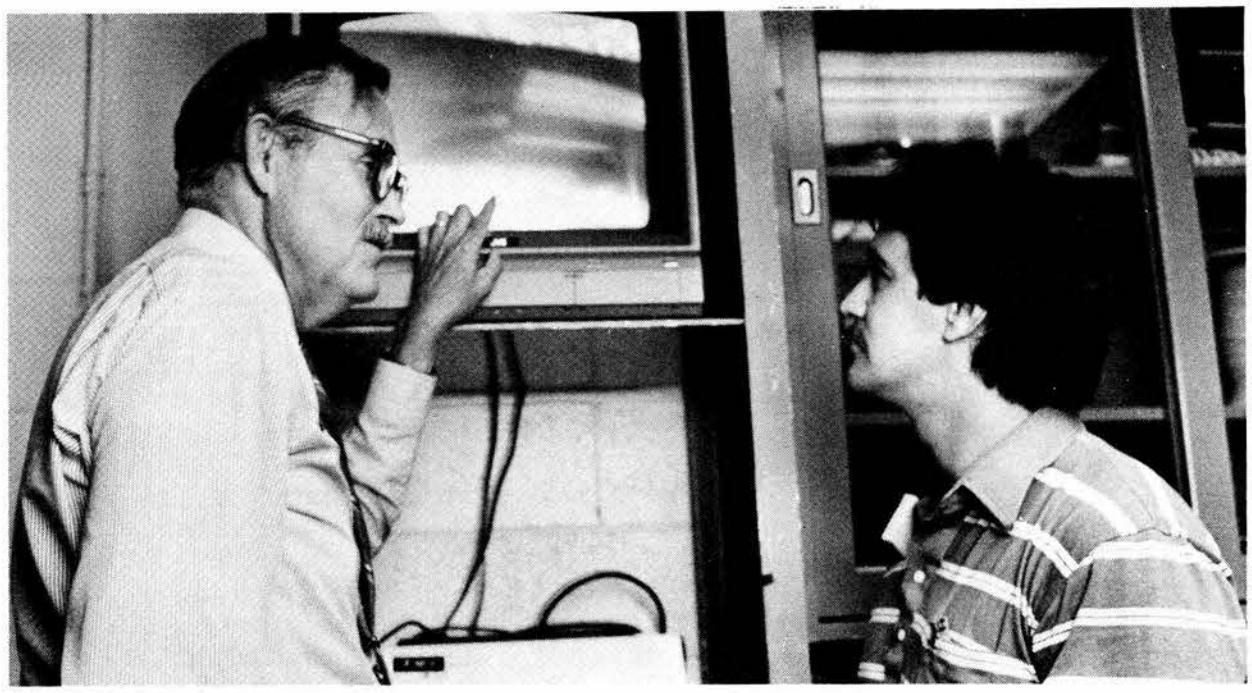
"The entire international metals industry has this potential melt/water problem, and people in the aluminum business, especially, are most forthright about it," says Lloyd Nelson (6427), principal investigator on the contract.

"Our contract work centers on steam explosion suppression," says Lloyd. "If explosions are to become a thing of the past for the aluminum industry, we need to know *why* they happen — and under what conditions they are most likely to occur.

"A typical operation where that knowledge might be applied is DC [direct chill] casting used in many metals industries to produce large, high-quality ingots," says Lloyd.

DC Casting

DC casting of aluminum uses a short, collar-like, water-cooled mold to form an ingot some five metres long and up to a metre thick. The casting is usually vertical, starting with a movable plug that fits snugly into the bottom of the mold. As molten metal is poured into the mold, the plug is lowered gradually on an elevator and a ring of solidified metal emerges continuously beneath the mold. Cooling water is sprayed on the outer surface of the collar-mold and on the emerging ingot, completing its solidification. A rapidly cooled ingot results.



LLOYD NELSON (6427, left) and Ken Guay (Ktech contractor employee) review high-speed film footage taken during a lab test to determine how wet surfaces of different materials affect aluminum's explosive reactions.

"The faster the cooling, the better the quality," explains Lloyd. "Fine-texture ingots and billets result from DC casting; there's no time for large crystals to form, as they do when processes with full-size molds are used. But when you have large quantities of water and molten aluminum [at temperatures between 700 and 800 degrees C] close together, there's danger of an explosion should the two come in contact accidentally.

Water triggers the explosion by causing the liquid metal to break up into many tiny droplets. The fast increase in metal surface area quickly generates large amounts of steam, causing an explosion. The explosion phenomenon may be extremely violent and can seriously injure nearby workers and damage equipment.

When reactive metals such as aluminum are

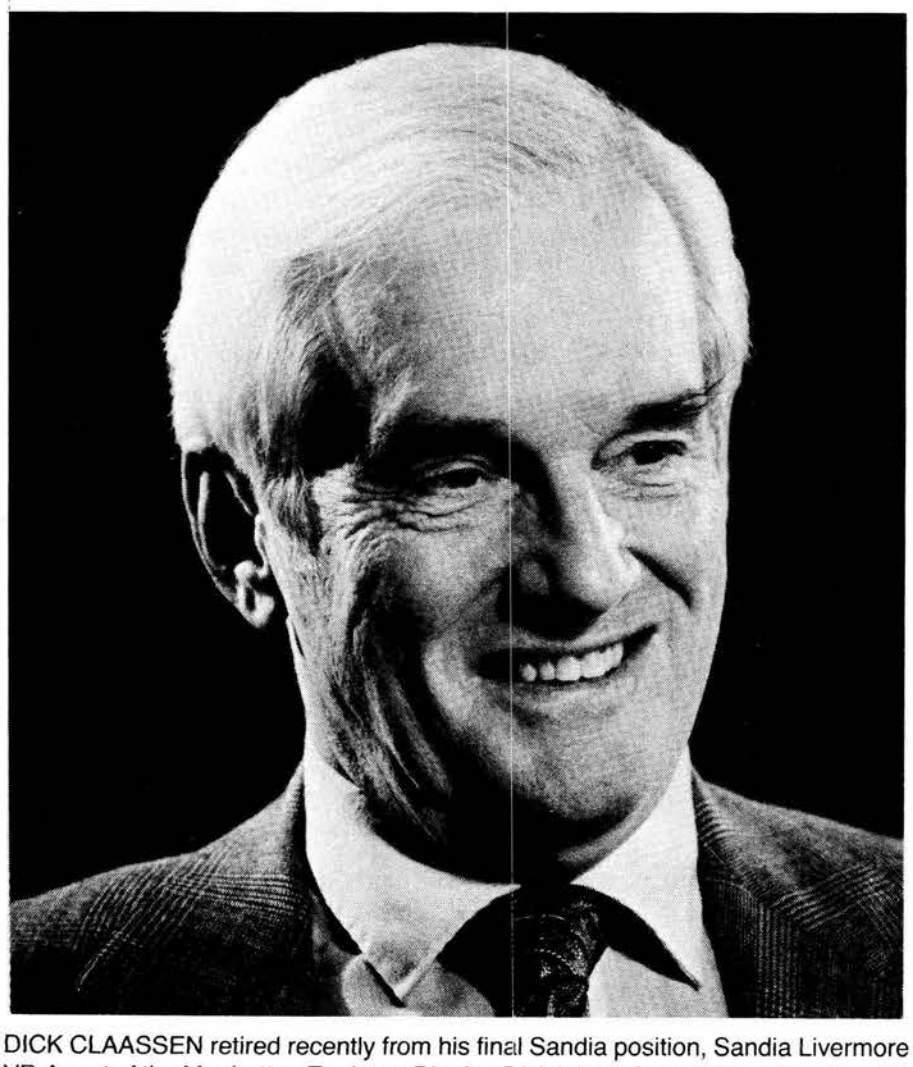
(Continued on Page Four)

LAB NEWS

VOL. 39, NO. 13 SANDIA NATIONAL LABORATORIES JULY 2, 1987

Farewell, Dick Claassen

Catalyst in Creating the Sandia Culture



DICK CLAASSEN retired recently from his final Sandia position, Sandia Livermore VP. A part of the Manhattan Engineer District, Dick joined Sandia in 1951.

"A long and distinguished career" is one of those phrases that are almost a cliché. But in Dick Claassen's case, it's highly accurate.

The "long" is easy to describe — 36 years of Sandia service, beginning as one of the early PhD recruits in 1951 and ending as Vice-President of Sandia Livermore May 31.

The "distinguished" is tougher to describe, but much more important: He played a key role, often that of catalyst, in creating much of the culture we know as Sandia.

Much of that culture we now take for granted — these are things we believe at Sandia: fundamental research is vital to Sandia's mission; education is important; so is professional development; one way to build the abilities of subordinates is to delegate authority and responsibility; another is to rotate them from one position to another; integrity is a fundamental concept.

And these are things we do: we have a Colloquium Series; we interview PhD candidates in a certain way; we hire the very best people we can find; we've changed our relationship with the integrated contractors over the years; we keep building the strengths of our research program; we work to ensure that, though we're located in three states, we're one institution. Again, Dick was involved in these actions.

As he puts it, "I've really been very fortunate in being on the front end of a number of things, and I'm also pleased that I've been able to operate pretty much across the whole spectrum, from fundamental research to the weapons programs."

So a review of Dick's career is, in a sense, a review of how Sandia came to be what it is today, one of the nation's preeminent R&D labs.

(Continued on Page Seven)

Antojitos

That's "Claassen," 2 A's, 2 S's -- Dick Claassen, to whom we say good-bye in several of these pages, was the last member of Small Staff -- and probably of Large (if I'm wrong, I'll hear about it shortly and will contritely print the proper retraction next issue) -- who could trace his involvement with the nation's defense program back to the Manhattan Engineer District. All of which is to say that we're not going to see the likes of Dick Claassen again.

With piercing brown eyes that could immobilize the timid, Dick was sometimes feared. But any fear soon turned to respect among the many Sandians who worked with him over the years -- just spell the name right, please. As our story shows, Dick worked hard to help Sandia become the strong R&D lab he visualized early on. He'll be missed.

* * *

More on Woody Bledsoe Longtime Sandians will note Dick's mention of Woody Bledsoe, who headed the math department here from 1957 to 60. He's spent most of his time since in Austin, Tex., where he's headed the University math department a couple of times and has become deeply involved with artificial intelligence programs on both the national and international levels. Currently, he's heading MCC Technology, which is sponsored by a consortium of semiconductor manufacturers, but he'll return to the U of Texas this fall to occupy the Peter O'Donnell chair in computing science. "The Sandia experience was one of the delights of my life," he notes. "And I do miss that Albuquerque climate."

* * *

A Glimpse of President McRae Sandians thought Jim McRae (President from 1953 to 58) was a wonderful guy -- "because he was," said Dick. "Interested in everything that had to do with the Laboratories, people-oriented, just a great guy."

And he told this story: One night McRae is snowed in in Los Alamos, so one of the Sandia taxi drivers has to drive up there and bring him home. It's late at night as they're driving into Albuquerque, and McRae asks, "Well, after you drop me off, where do you go, Joe?" "I have to go to Sandia and turn in the car," replies Joe. "Why don't you just take the car home tonight?" responds McRae. "Oh, no, I can't do that," answers Joe.

So McRae says, "Fine. I'll drop you off, and I'll take the car home. They won't say anything to me." But Joe protests, "But then I couldn't get to work in the morning." "That's all right," responds McRae. "I'll pick you up." "Oh, you mustn't do that. I have to be at work early. I have to leave at 6." "Oh, that's okay."

So the next morning comes a knock on Joe's door in the far North Valley. His wife says, "Who's that, Joe?" And Joe replies, "Oh, it's the President. He's come to pick me up." ●BH

* * *

Aquellos son ricos, que tienen amigos. (Wealthy are those who have true friends.)

Welcome

Albuquerque
Joan Dawson (21-1)
Nellie Denio (21-1)
Leona Dennis (21-1)
Patricia Dickinson (21-1)
Sandra Hinton (22-2)
Pamela Lackey (2642)
Susan McRee (22-2)
Laura Nance (22-2)
Monica Pompeo (21-1)

Illinois
David Ingersoll (2512)

Maryland
Eric Chason (1111)

Michigan
Jeffrey Kallio (132)

Missouri
Bradley Parks (6442)
Susan Stiles (2313)

Ohio
Steven Hennis (2857)
Randolph McWilliams (1845)

Oregon
Frederick Reynolds (1233)

Pennsylvania
David Treusch (2313)

LAB NEWS

Published Fortnightly on Fridays

SANDIA NATIONAL LABORATORIES

An Equal Opportunity Employer

ALBUQUERQUE, NEW MEXICO
LIVERMORE, CALIFORNIA
TONOPAH, NEVADA
AMARILLO, TEXAS

Sandia National Laboratories is operated by Sandia Corporation, a subsidiary of AT&T Technologies, Inc., and a prime contractor to the U. S. Department of Energy.

BRUCE HAWKINSON, Editor
PHYLLIS WILSON, Writer
IRENE DUBICKA, Writer
RANDY MONTOYA, Photographer
GERSE MARTINEZ, Asst. Photographer
JANET WALEROW, Editorial Assistant
SANDRA MORA, Assistant
BARRY SCHRADER, Livermore Reporter

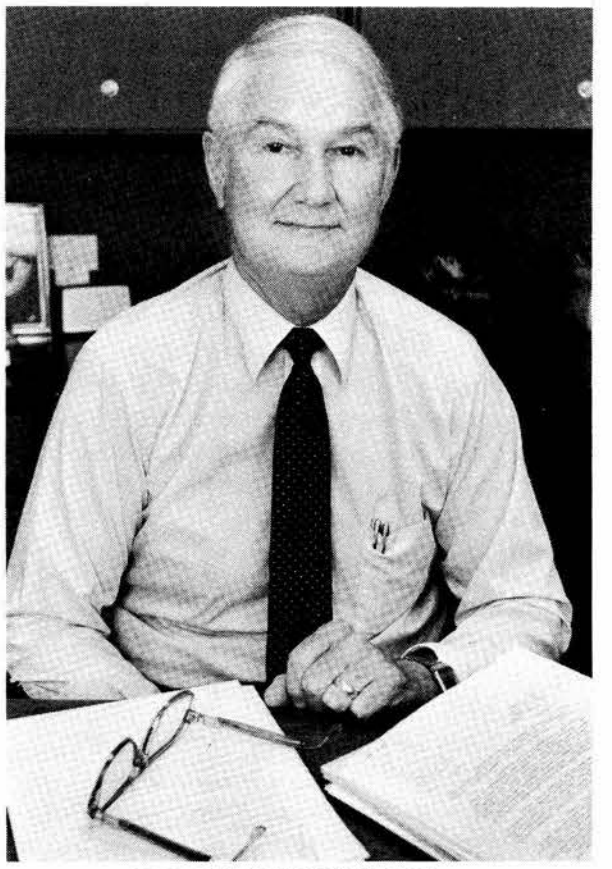
Member International Association of Business Communicators

Sympathy

To Dorothy Hall (3500) and Vernon Marsh (2833) on the deaths of their mother on April 24 and their father on May 29, in Raton.

To Cynthia Romancito (3316) on the deaths of her son and nephew in Zuni Pueblo, June 19.

To Gene Hammons (1144) on the death of his son in Albuquerque, June 21.



HERMAN MAUNEY (7200)

Mauney Named Director 7200

Herman Mauney has been named Director of Systems Evaluation 7200, effective June 4.

Herman joined Sandia in July 1953 as a staff member in a weapons project group, and in March 1965 he was named supervisor of the Special Systems Division in the Systems Engineering Department. He was promoted to manager of Systems Development Department II in July 1970. In his 20-plus years in weapons development, he worked on electrical systems development, radiation effects testing, and exploratory systems development and managed the development program for the Navy's Mk4 reentry body.

In 1977 Herman joined the Safeguards and Securities organization where his assignments included the Air Force Base Security program, DOE Safeguards program, and reimbursables programs in support of NATO Theater security upgrade activities. He joined the Stockpile Evaluation Department in 1984 and was manager of Weapons Evaluation Department 7260 until his promotion.

"We're going to continue working to improve the rapport among Org. 7200, the systems development organizations in 5100 and 8100, and the component organizations in 2000," Herman says. "It's something Heinz Schmitt and Jack Wiesen started in past years, and we'll push for increasing the 'presence' of 7200."

Herman has a BS in electrical engineering from North Carolina State College. He has been active in the affairs of Bethany College in Kansas for the past ten years, serving on the board of directors and now co-chairing a national fund-raising campaign. In his spare time, he enjoys flower and vegetable gardening. He and his wife Emily live in the NE Heights. They have three grown children and three grandchildren.

Congratulations

To Terri (6257) and Steve (5245) Ortiz, a son, Benjamin Garrett, May 14.

To Lin and Steve (7233) Ohrt, a daughter, Jamie Rae, May 24.

To Ginny Eckhart (2833) and Dave Williams (6429), married in Albuquerque, May 31.

To Jeannie and Tim (3437) Lucero, a daughter, Amber Joy, June 11.

To Carolyn and Steve (1533) Montgomery, a daughter, Sara Elizabeth, June 15.

To Gwen (155) and George Pullen, a son, Bryan Rockwell, June 18.

Distinguished Flame Researcher Ends CRF Visit

An internationally recognized pioneer in flame research, Prof. Graham Dixon-Lewis from the University of Leeds in England, is completing a six-month stay at the Combustion Research Facility where he has worked with Sandians on computational modeling of combustion chemistry problems.

Graham, who holds a Personal Chair (a post without administratrive responsibility, awarded for distinction in research) in the Fuel and Energy Department at Leeds, has been collaborating with Bob Kee (8245) and Jim Miller (8353) on defining the properties of strained flames. These are flames with gas velocity gradients within the flame itself.

This is Graham's second visit to Sandia. The first was three years ago following an International Combustion Symposium held in the U.S. At that time he brought the detailed transport properties computational program he developed at Leeds to Sandia for use in the calculation of properties of laminar flames and other reactive systems.

That visit was only two weeks long, but it was long enough to pique his interest in the work being done at Sandia, and he waited for an opportunity for a research grant to return and work with CRF researchers. "I've found the international reputation of the CRF to be well deserved," he notes. "The people here have been very helpful and are very knowledgeable in computational flame modeling."

After returning to England, he plans to work by telephone with Bob and Jim in co-authoring a paper on the development of codes for modeling strained flame systems using "continuation methods" — that is, Graham explains, "Once you've got one solution, you can extrapolate along a stability curve much more rapidly than by recalculation of different strain rates from scratch."

Flame Knowledge Flimsy in 50s

Graham's studies of flames began in the 50s when the understanding of combustion properties was only very general. "People had done measurements of things such as burning velocities of premixed flames, but there were vast disagreements, even between these normally straightforward measurements," he points out. "What wasn't known then was the internal structure of the flame — how the composition and temperature varied. The flame itself was regarded almost as simply a discontinuity between burnt and unburnt gases.

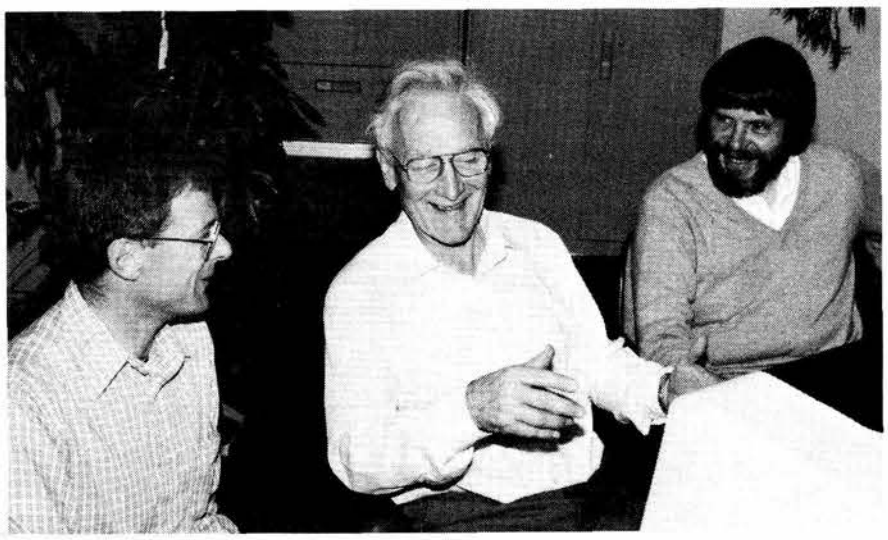
"I wanted to do something about moving inside these systems," Graham continues, "so I started by measuring temperature profiles, then composition profiles in specific fuel-rich, hydrogen/oxygen-supported flames — a fairly simple system but one with all of the general principles there, and one that was thick enough to give a chance of reasonably accurate measurement."

The measurements still weren't as precise as he desired, so he started looking at what he calls the "inductive method" of calculating flame properties from basic physical and chemical data. This was the start of his computational work, and he kept the two studies going in parallel for some 10 years. By the mid-70s he chose the computational route "because there was an enormous amount to be accomplished and this seemed to me to be where the advances were to be made."

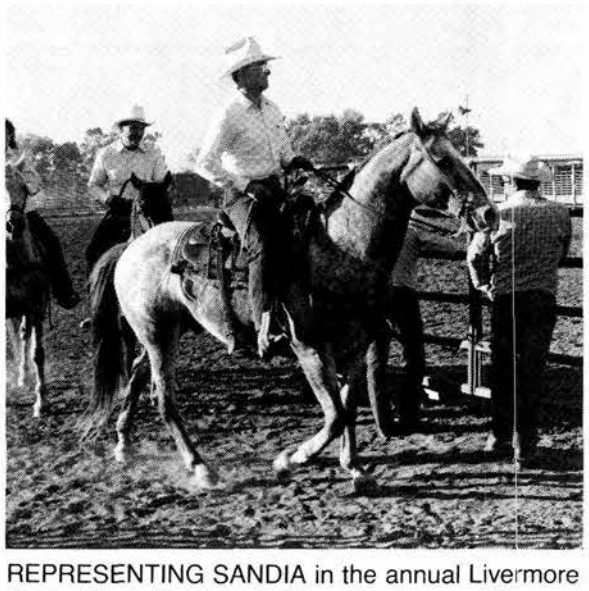
In the late 70s other nations' researchers were making progress in the same field, so Graham and scientists from Japan, West Germany, and the U.S. held a workshop to discuss the problems concerning counterflow flames (an example of strained flames that are often used in computational studies). This initial effort at international collaboration resulted in a joint paper by 15 authors delivered at the International Combustion Symposium in 1982.

Before appointment to his Personal Chair at Leeds, Graham was a Senior Research Fellow supported by British Gas, and received an Honorary Readership from the University for his distinction in flame research. When he returns to England, he will continue his flame studies. "I hope to return again one day to Sandia for more collaborative research," he concludes.

Graham's wife Pat is skilled in the culinary arts and teaches continental cuisine in England. While in Livermore she has served as a volunteer in the children's program at the Livermore Library.



PROF. GRAHAM DIXON-LEWIS and his Sandia colleagues Bob Kee (8245, left) and Jim Miller (8353, right) enjoy a light moment while going over a computational problem.



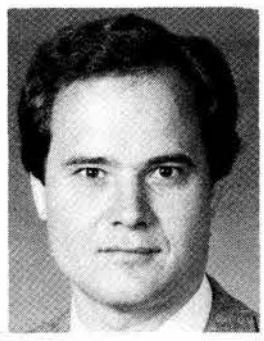
REPRESENTING SANDIA in the annual Livermore Rodeo Week Celebrity Calf-penning Competition was Ron Detry (8200), who participated at the Robertson Park rodeo stadium. His three-person team didn't get its three calves separated from the herd and penned in the time allotted, but at least Ron stayed on his horse.

SANDIA LIVERMORE NEWS

VOL. 39, NO. 13 SANDIA NATIONAL LABORATORIES JULY 2, 1987

Melville Medalist

Siebers Shares ASME Award



Dennis Siebers (8362) and his two co-authors from Stanford University have been named 1987 Melville Medalists.

This award, the highest honor given each year by the American Society of Mechanical Engineers (ASME), goes to the best original paper presented before the Society or approved for publication by the ASME journals. Dennis, Robert Moffat, and Richard Schwind won the award for their paper, "Experimental, Variable Properties Natural Convection from a Large, Vertical, Flat Surface."

The award, first presented in 1927, was named after Admiral George W. Melville, the 18th president of the Society.

Dennis joined Sandia in 1976. He first worked on the B77 weapon program and then the Solar Thermal Central Receiver project. In 1983 he earned his PhD from Stanford University under the Doctoral Study Program. His dissertation research involved an experimental investigation of heat transfer, covering regimes of mixed and natural convection that were important to solar central receivers. This work resulted in the paper now being recognized by ASME.

More recently, Dennis has worked on internal combustion engine research, concentrating on the experimental investigation of transient spray mixing, ignition, and combustion in a diesel engine. He has also been involved in the RAPRENOx experimental program, which seeks to greatly reduce the amount of NOx in diesels and other combustion systems.

The Melville Medal will be presented at the annual winter meeting of ASME in Boston this December.

Congratulations

To Jean and Dennis Siebers (8362), a daughter, Anna Katherine, June 15.

To Tracey (8023) and Bob Lamee, a son, Christopher Edward, June 17.

Sympathy

To Barbara Moy (8260) on the death of her husband in Livermore, May 25.

To Ron Ludolph (8413) on the death of his father in Freeport, Ill., June 7.

To Marv Loll (8163) on the death of his sister in Hazen, N.D., June 9.

To Jake McMichael (8161) on the death of his father in Sarasota, Fla., June 16.

A RARE SIGHT, but a pleasant one, is seeing temporary mobile office buildings leaving Sandia. Three large modular buildings — Mobile Offices 19, 20, and 21 — were removed recently. They had been used for about five years to hold the occupants of Bldgs. 911 and 912 as seismic upgrading and renovation of those facilities were underway.

Aluminum Safety Study Is Model

Avoid the Pitfalls: Know those Tech Transfer Policies

Everyone knows that the U.S. faces increased foreign competition in the production of goods and services, according to Glenn Kuswa, manager of Technology Transfer and Management Department 4030. "To help stem the tide, we need to use our federal technical resources more efficiently in helping the private sector," says Glenn.

"Our effort for the aluminum industry [see "Contract with Aluminum Industry" story] is a very good example of how we at Sandia can spin off some of the things we've learned to help others."

The realization that this country might be losing its competitive edge led, a couple of years ago, to a much greater push for technology transfer to private industry from federal labs such as Sandia. Before, the Labs had rarely taken on non-government work; now, however, work for outsiders will probably increase, Glenn points out, though it likely will never account for a major share of Sandia funding.

Proprietary Interest

"We've learned we must approach work for the private sector with great care," says Glenn. "Take proprietary interest, for example. Sometimes we encounter great sensitivity about informing others of a company's interest in a Sandia technology.

"For instance, a pharmaceutical firm may wish to keep its interest in a certain advanced material very quiet because the industry is quite competitive, and often it takes years of research to gain government approval for new products. Tipping off a competitor could allow rapid introduction of a competitive product and reduce the advantage to the original developer.

"On the other hand, a group of private companies that funds research on improving safety conditions — an example is our contract with the aluminum industry — may be willing to openly share research results."

Sandians should be aware of the Labs' technology transfer policies, Glenn comments, so they can avoid pitfalls that sometimes arise when commercially valuable information is sought by outsiders. "The policies are not complex," says Glenn, "but employees need to keep them in mind when they're approached for help by someone in private industry." He outlined those policies for LAB NEWS:

- If Sandia initiates work on its own that results in inventions or commercially valuable data, we sometimes delay publication to gain patent rights or to assure that U.S. industry obtains the lead. We can discuss the data with others through signed non-disclosure agreements (signed by the concerned vice-president after coordination through the legal organization) if this can help laboratory programs or speed commercialization. Usually we offer equal access to U.S. recipients; however, occasionally we may arrange a means to make the technology exclusive. Obtaining exclusive rights, which requires extensive coordination with DOE, is the preferred course when substantial risk is involved in commercial introduction of a new technology.
- Sandia will continue to release scientific results with minimum delays, consistent with the above points. Working more closely with the commercial sector or on government-funded problems of patent interest may sometimes appear as a negative to eager-to-publish Sandia staff people. But Labs management recognizes and rewards employees who make contributions to either the commercial sector or the scientific literature.
- We should generally not publicize the interest of a particular company in a specific Sandia technology unless the company agrees to such publicity.
- We promote equal access to our technologies by U.S. firms, but are not obliged to identify additional users for applications that are first identified through an individual company's prior efforts.
- When we work with companies or groups that provide financial support to Sandia, we will have contractual agreements on data ownership and release. Generally, when a company totally supports work within the Labs, the rights to commercial data such as patents or software become the property of the funding source; however, Sandia and the government will frequently retain some rights for their own use. In the case of shared funding, we will expect some contract provisions that give preferential benefits to the funders.

(Continued from Page One)

Safety

present, chemical reactions *may* occur, increasing the violence of the explosion, according to Lloyd. "Aluminum is a highly reactive metal," he says. "In fact, it's nearly in the same category as sodium for chemical reactivity, and can burn in air when finely divided.

"Aluminum industry people have been studying the explosion threat for more than 30 years," Lloyd continues. "Although they've made great progress, no one yet has all the answers on how to prevent the explosions. That's why they asked for our assistance."

A team of Sandians (Severe Accident Containment Response Division 6427) supervised by Marshall Berman has done extensive research on steam explosions since the mid-70s, when the Nuclear Regulatory Commission asked Sandia to study the phenomenon and its possible threat to nuclear reactors in the event of a core meltdown.

"As a result of that NRC research, we've done a lot of experimental, theoretical, and numerical work on steam explosions," says Marshall. "Now, under the new contract, we're in a position to transfer some of that technology."

Spectators Until Recently

"We'd been watching the steam explosion problem in the metals industries since 1975 — but only as spectators," Lloyd says. "We were worried and scientifically concerned, but until tech transfer policies were changed for national labs a couple of years ago, we weren't in position to pass along some of the things we felt we'd learned that might be helpful to the metals people."

The first official interaction with the aluminum industry occurred in July 1985 when the Labs hosted a two-day meeting for aluminum industry representatives — most from U.S. firms — to discuss the explosion problem and approaches that might be used to solve it. After year-long negotiations among Sandia, the Aluminum Association, and DOE, work began on the contract in October.

In addition to its theoretical and experimental expertise on steam explosions, the Labs was chosen to do the research because of its existing facilities and equipment for both laboratory and field experiments, making start-up time minimal.

To zero in on those conditions that cause steam explosions, Lloyd, Maureen Eatough (6427), and Ken Guay (Ktech contractor employee) have conducted a series of small-scale lab experiments to determine how wet surfaces of different materials affect the explosive reaction. The experiments involve dropping molten aluminum into saucers (with different kinds of inside surfaces) submerged in water-filled tubs.

"We've tested a wide variety of surface materials — everything from rusted steel to graphite," says Lloyd. "And it's apparent that the surface material affects the initiation and force of the explosion." He, Maureen, and Ken will present their preliminary findings to Association members at Sandia next month.

Viscosity Experiments

Lloyd theorizes that another factor may be a key to solving the steam explosion problem. He and Ken have experimented with increasing the viscosity of the water contacted by molten metal. By dropping molten tin into a beaker of water, they learned that the addition of a thickening agent such as glycerol or cellulose gum to the water (giving it the consistency of various grades of thin motor oil) would, in fact, suppress an explosion if enough of the agent were added. "We found that a 15-fold increase in viscosity over that of water alone is needed to suppress the molten-tin explosions," reports Lloyd.

"We believe the improvement is related to the slower collapse of steam bubbles near the molten tin," Lloyd explains. "When the viscosity of the coolant solution is low — as in water alone — steam bubbles form and collapse almost immediately. That results in spontaneously triggered explosions near the top of the container.

"But if the solution is viscous enough, it prevents rapid collapse of the steam bubbles near the tin drop, thus averting an explosion. The tin eventually reaches the bottom of the container and solidifies there as a metal pellet."

GEOLOGIST MAUREEN EATOUGH (6427) analyzes aluminum debris after a lab experiment to reconstruct what happened during the test explosion.

A field-scale experiment coordinated by Bill Marshall, Jr. (6427), using a molten mixture of iron-aluminum oxide, confirmed the viscosity finding. The large-scale test resulted in only a gentle, partial breakup of the melt when it was dropped into a water/cellulose gum solution. Control experiments that used water alone produced violent spontaneous explosions.

Future Activities

Future experiments will explore suppression of aluminum explosions at surfaces and during free-fall through water and study the effects of alloying elements. More large-scale tests, plus theoretical and numerical modeling studies by Mike Young (6425) and others, are also in the works.

Besides Lloyd, Maureen, Ken, and Bill, others who've done work related to the Association contract are Andrew Kraynik (1511) and Peter Rand (1813), consultants on the viscosity experiments; Maury Karnowsky (1832), who helped with the metallurgy; and contractor employees Fred Bauer, Jim Fisk, George St. Clair, Michael Turner, and Steve Harbour, who assisted on the field-scale experiments.

"There's still much to be learned about steam explosions — for instance, how they're affected by presence of additives to water or metal," says Lloyd. "In that respect, the Association contract is advantageous for Sandia, as well as for the aluminum industry." •PW

Take Note

Estelle MacKenzie (CPS, 5210) and Carol Kaemper (21-1) were installed as officers of PSI (Professional Secretaries International), Albuquerque Chapter, at the PSI business dinner and installation meeting June 9 in Albuquerque. Estelle is the vice-president, and Carol is serving her second term as the recording secretary.

* * *

A Partnership Production TV team from New Zealand was at Sandia recently to film "a day in the life" of Myron Garcia (7412). The New Zealanders are traveling the U.S. filming various Americans to show aspects of American culture that are not included in popular commercial TV programs. Material gathered from the filming will be used in a series of short features for New Zealand TV, a documentary film by the New Zealand Dept. of Education, and a book by Gordon McLaughlan (the writer on the production team). Myron is from Acoma pueblo but lives at Paguate, a village on the Laguna reservation. He is an electronics technican in the Electronic Fabrication Division.

* * *

The American Intercultural Student Exchange (AISE) program is seeking host families for high school students from Sweden, Norway, Denmark, Finland, Holland, Belgium, Austria, Switzerland, Germany, Spain, France, Italy, Ecuador, Australia, and Japan for the school year 1987-88. Students are ages 15-17 and will arrive in the U.S. in August. Host families may select the country and student they prefer. You don't need to have high-school-age children to host a foreign student. If interested, call Mary Ann Vittitoe (wife of Charles, 2322) on 299-9298.

Happy Anniversary DOE/AL! "The Way We Were - The Way We Have Grown" is the theme of a special exhibit in the lobby of the National Atomic Museum highlighting the 40th Anniversary celebration of DOE's Albuquerque Operations Office. The display chronicles the growth of the old Manahattan Project sites, as well as the new facilities administered by DOE/AL. Memorabilia provided by DOE retirees are also featured. Museum hours are 9 a.m.-5 p.m. every day, including holidays.

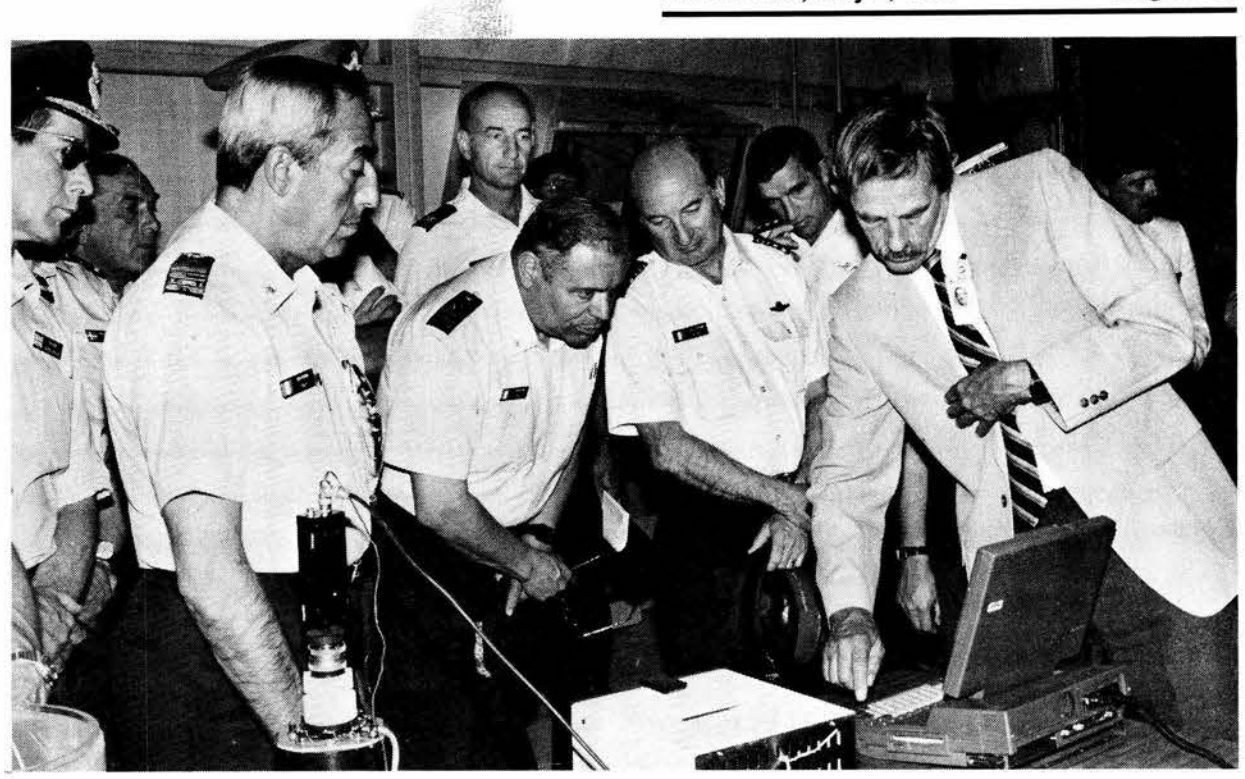
The Storehouse (106 Broadway SE) needs the extra produce from your gardens and the surplus food items from your pantries. A dramatic increase in the distribution of food baskets is rapidly depleting the Storehouse's food supply. "Think Thanksgiving in July" will help the "working poor" and those struggling with unemployment. Call the Storehouse on 842-6499 for more information on how to help.

* * *

A benefit for the New Mexico Museum of Natural History is scheduled for July 12 from 1 to 5 p.m. at the UNM Football Stadium. The "Borden's Only Albertosaurus Sunday Natural History Mystery Dinosaur Debut and Eat-'Em-Up Ice Cream Feast" features the unveiling of the Museum's new life-size (30') bronze Albertosaurus. Entertainment includes a car show, draft horses, carriages, the Borden Food train, Elsie and Beauregard, the Borden Gang, and various dance groups. Admission includes all-you-can-eat ice cream cones, floats, and sundaes. In addition, tickets can be used again for free admission to the Museum from July 13 to Aug. 31. Museum summer hours are 9 a.m.-5 p.m. Contact Glenn Kuswa (4030) on 6-4945 for benefit tickets.

* * *

Printed guides to Albuquerque's Cultural Corridor are now available at all branches of the Albuquerque Public Library. Walk, drive, take a bus or a trolley. The brochure inclues a map and listings of the arts, cultural events and exhibits, and historic attractions to be enjoyed along the Corridor from Old Town through Downtown and UNM to the Nob Hill district.



NATO AIR CHIEFS visiting KAFB in June stopped by the Labs, where Don Bauder (DMTS, 9111) demonstrated an item-tagging system, one of Sandia's technologies for on-site inspection of compliance with nuclear arms reduction treaties. Eighteen NATO generals toured the Base; shown here are (front row, from left): Air Chief Marshal Sir David Craig, United Kingdom; Lieut. Gen. Franco Pisano and Lieut. Gen. Cesare Fazzino, Italy; and Lieut. Gen. Jacques Lefebvre, Belgium.

DALE COMPTON (center), Senior Fellow of the National Academy of Engineering; Bob Gregory (2100, left); and Fred Vook (1100) examine one of the posters displayed during a recent meeting that brought together key figures from the DOE National Labs and the U.S. semiconductor industry. The National Academy sponsored the three-day meeting, which was organized by Sandia and the Semiconductor Research Corporation and hosted by Sandia. The meeting (attended by about 70 scientists and engineers from nine labs, about 30 from nine semiconductor companies) provided an opportunity for labs representatives to explain their capabilities related to the industry's major technical concerns, and for those representing the troubled industry to explain their needs in specific areas. The many proposals for increased DOE lab/industry interactions made during the meeting are now being evaluated.

* * *

If you or your children are interested in acting and the theatre, contact the Albuquerque Little Theatre on 242-4750 and sign up for summer acting lessons. Classes for children are for kids 7 to 18 years old, and are split between beginners and advanced students. Adult classes are divided into improvisatory and scene study classes.

* * *

The 5th Symposium on Space Nuclear Power Systems, organized by UNM's Institute for Space Nuclear Power Studies, is scheduled Jan. 11-14, 1988, in Albuquerque. Frank Thome (6511) is chairman of the Instrumentation and Control session. The program will include technical sessions for presentation of contributed papers, and plenary sessions for invited papers. Papers are limited to no more than four pages. Deadline is July 24. For further information, contact Prof. Mohamed El-Genk, Institute for Space Nuclear Power Studies, Chemical and Engineering Dept., University of New Mexico, Albuquerque, NM 87131.

* * *

Folks in Safety Engineering Div. 3316 and others in Bldg. 838 have raised more than $300 to help secretary Cyndi Romancito cope with the expenses she incurred when her son and one nephew were killed in a vehicle accident, and three other nephews and her father were injured. "Right now, Cyndi needs financial and emotional support from all of us," says her supervisor, Don Rost.

Retiring and not shown in LAB NEWS photos: Ben Benjamin (7137) and Ed Ehrman (2544).

Jill-in-the Pulpit

Unlike some fish and mollusks, plants do not usually change sex — but there are some spectacular exceptions. Jack-in-the-pulpit and some of its close relatives are either male or female. In its first year the plant is usually male, but as it grows larger it changes into a female. It is possible to manipulate the plants' sex by growing them in poor, dry conditions, which produce males, or in a rich environment to make females.

New Scientist

Events Calendar

July 2-4 — Art Windows on Route 66, art displays on storefront windows, primarily Nob Hill area; free, 256-2047.

July 2-26 — Exhibit, "Clay in '87," New Mexico Potters Association; upper gallery, UNM Art Museum, 277-4401.

July 2-27 — Exhibit, "Santa Fe Trail," photographs by Joan Myers, an exhibit of images along the 1500-mile journey from Missouri to New Mexico, sponsored by the Smithsonian Institution Traveling Exhibition Service; 11 a.m.-5 p.m. Tues.-Fri., 1-5 p.m. Sat. & Sun.; Albuquerque Museum, 242-4600.

July 2-31 — Exhibit, "Maya: The Image from the Western World"; 9 a.m.-4 p.m. Mon.-Fri., 10 a.m.-4 p.m. Sat.; main gallery, Maxwell Museum of Anthropology, 277-4404.

July 2-Aug. 2 — Exhibit, "Mickey McConnell: A Personal View of the Ancient World"; Jonson Gallery (UNM), 277-4967.

July 2-Aug. 2 — Focus Photo Series: Mary Peck, impressions of the Florida Everglades; Albuquerque Museum (artist reception June 7, 2-4 p.m.), 243-7255 or 242-4600.

July 2-Aug. 31 — Exhibit, "From the Center Place: Contemporary Zuni Pottery and Its Makers"; 9 a.m.-4 p.m. Mon.-Fri., 10 a.m.-4 p.m. Sat.; Maxwell Museum of Anthropology, 277-4404.

July 3 — Old Town Optimists Fireworks Display, dusk, NM State Fairgrounds Race Track, 265-1791.

July 3-5 — Diamond Jubilee Quilt Show, sponsored by NM Quilter's Association; noon-4 p.m. Fri. & Sun., 10 a.m.-4 p.m. Sat.; Albuquerque Garden Center (10120 Lomas NE), 892-3354.

July 3-11 — Appaloosa National Championships; 8 a.m., 1:30, & 7 p.m.; NM State Fairgrounds, free, 243-3696.

July 4 — "Spirit '87," Kirtland Air Force Base, all-day 4th of July celebration: food, games, contests, displays, demonstrations, NM Symphony Orchestra Pops Concert at 8:30 p.m., fireworks display; 10 a.m., East Parade Grounds, KAFB.

July 4 — Children's Concert I, "The Reluctant Dragon," Santa Fe Desert Chorale; 11 a.m., First Unitarian Church (370 Carlisle NE), 1-988-2282.

July 4 — Summerfest '87: "Taste of Albuquerque," food prepared by chefs from NM Chefs and Cooks Association, talent show, Big Band and rock 'n' roll music; 5-10 p.m., Civic Plaza, 768-3490.

July 4 — American Legion Fireworks Spectacular, 8 p.m., University Stadium (University & Stadium SE), 243-1901.

July 10-11 — UNM Summerfest Festival of New Plays, "The Home"; 8 p.m., Rodey Theatre, 277-4332.

July 10-26 — "The Bat," mystery by Mary Roberts Rinehart; 8:30 p.m., Corrales Adobe Theatre, 898-3323.

July 10-26 — "Last Days at the Dixie Girl Cafe," Robin Swicord comedy; benefit for NM Multiple Sclerosis Society; 8 p.m. Thurs.-Sat., 6 p.m. Sun.; Keystone Theatre (3211 Central NE), 255-6819.

July 10-Aug. 2 — "Loot," farce by Joe Orton about criminal activity in England; 8 p.m., Vortex Theatre, 247-8600.

July 11 — Summerfest '87: Chinese Night; 5-10 p.m., Civic Plaza, 768-3490.

July 12 — Movietime at the KiMo, "Ship of Fools," passengers aboard ship refuse to notice the rise of German fascism; 7 p.m., KiMo Theatre, 848-1374.

July 12 — Sunday Jazz at Madrid: Blues Day, featuring Charlies Summons Blues Band, Jump Street, and Blues Kings; 3 p.m., Oscar Huber Memorial Ballpark (Madrid), 842-6659.

July 13 — UNM Lecture Under the Star Series: "Blues History 101: A Musical Narrative," by blues vocalist Peter Thorpe; 8 p.m., UNM Central Mall (north of Student Union Bldg.), 277-4706.

July 14 — St. Bonaventure Feast Day, Corn Dances, Cochiti Pueblo, 465-2244.

July 16-17 — UNM Summerfest Festival of New Plays, "Girl"; 8 p.m., Rodey Theatre, 277-4332.

WINNERS FOR THE SECOND TIME — A team of Sandia photovoltaic experts (and runners), repeating last year's win, recently took the corporate trophy for a 5K run sponsored by IEEE in conjunction with its Photovoltaic Specialists Conference in New Orleans. Showing off the trophy are team members (from left) Dave King, Paul Basore (both 6224), Eldon Boes (6221), Dan Arvizu, James Gee (both 6224), Clement Chiang (6221), and Doug Ruby (6224).

THIS SUMMER'S PARTICIPANTS in Sandia's Historically Black Colleges & Universities (HBCU) summer student program met recently to tour Labs facilities; from left, they're Jesse Sims (6221), Patricia Salisbury (HBCU coordinator, 3510), Tom Whitney (6321), Jocelyn Wright (6225), Walter Craig (2126), Vanessa Watkins (1245), Grady Moshay (1266), Melanie Burton (5249), Daryl Bowe (7552), Charles Newsome (2142), and Thaddeus Von Butler (5267). Not pictured: Charles Lawson (5255), Aaron Galloway (8343), and Terri Quinn (8361). The HBCU program enables outstanding students and faculty members to work at Sandia during the summer in various scientific disciplines. Tom Whitney and Walter Craig represent the teaching ranks in this summer's program; the other participants are students.

AT&T Savings Plans

The following are the Earnings Factors for April 1987, for the AT&T Savings and Security Plan and the AT&T Savings Plan for Salaried Employees.

	Earnings Factors *April*
SPSE (Savings Plan for Salaried Employees)	
AT&T Shares	1.0258
Government Obligations	.9939
Equity Portfolio	.9896
Guaranteed Interest Fund	1.0076
Diversified Telephone Portfolio	
Unrealized Appreciation	.9688
Realized Appreciation	.0048*
SSP (Savings and Security Plan - Non-Salaried Employees)	
AT&T Shares	1.0260
Guaranteed Interest Fund	1.0078
Diversified Telephone Portfolio	
Unrealized Appreciation	.9687
Realized Appreciation	.0046*

* The 1 has been removed from the earnings factor. Current month's DTP earnings may be calculated directly: Earnings Factor x DTP Current Worth = Current Month's Earnings.

Bringing In the Heavy Hitters

Recruiting: An Enviable Record

Recruiting outstanding people to come to a little known part of the country to work in a less known laboratory in an absolutely unknown research group was no easy task.

So Dick's proud of his record in recruiting new MTSs. In addition to George Anderson and Frank Nielsen (mentioned in the "Manhattan Engineer District" section of the main story), he and Frank Hudson brought in Al Narath (former Sandia EVP, now VP of Government Systems, AT&T Bell Labs — where he'd been offered a job after graduation), Orval Jones (20), Ev Beckner (5000), John Crawford (8000), Fred Vook (1100), and Dick Lynch (6300), among others; Dick personally recruited Dick Schowebel (1800) and Rick Wayne (8400). Most of these people hired in between 1957 and 1968.

Dick also recruited the first black woman hired at Sandia, Kathy Lawson (and later promoted the first woman, Ruth Whan, 1820, to department level).

"The thing that was most helpful to me in recruiting was all the talks I'd had with Glenn Fowler," says Dick. "Some PhD new-hire candidate would ask me, 'Could I do this or that at Sandia?' and I could answer with authority because Glenn and I had discussed it earlier. And what we'd agreed we were looking for was not people who could solve a specific fireset problem, for example; rather, we wanted people who were very knowledgeable in the fields that *underlie* the technologies at Sandia.

"So I was able to offer them quite a bit of latitude in selecting their actual research areas. And, of course, it helped that, in the post-Sputnik era, everyone was interested in the magic words 'fundamental research.' "

Frank and Dick also developed what has become the Sandia routine for handling Sandia visits by prospective PhD candidates — a host, a presentation of the dissertation work the candidate was doing or had done, a series of interviews, "an appropriate couple of Sandians taking the candidate to dinner, and follow-up by the host."

The two also originated a recruiting brochure that's still being reissued every few years. "The beauty of it was that all we had in it was a series of simple, factual paragraphs describing the research actually being done at Sandia," Dick notes. "That was a major contrast to the brochures put out by others, especially in those post-Sputnik days — a lot of places decided to be hotshot research labs, and almost all of them hired a slick brochure writer who included lots of color photos of the campus or the lab and glowing descriptions of what the research program would look like in the future — lots of fanfare, in other words.

"Then a few years later, you'd hear there was a new board of directors and 'We're not going to do that anymore.' So there was a lot of skepticism about that sort of thing on campus.

"We could just hand our brochure to a professor or a job candidate and say, 'These are things that our people are already doing.' It contained no photos at all, but it was nicely printed, and it really worked well."

Over the years, Dick has seen recruiting as vital to the Labs and has remained concerned with both process and result. He's heard the complaints that some new people seem more loyal to their discipline than to the Labs, but he feels that's always been true: "When I hired Gordy McClure in 1957, he was the first PhD in two years; we'd lost 10, and that was out of a small supply." So he's pleased with today's pattern: "The people coming in today are so much better than we were when I came in that I don't have any worries."

(Continued from Page One)

Claassen

Before he'd ever heard of Sandia, Dick was involved with the nation's defense program; in fact, he was in a part of the Manhattan Engineer District that was actually based in Manhattan. (The District got its name simply because its original offices were in that borough of New York City.) It was 1944, and Dick worked in the lab that did the design work for the gaseous diffusion plant at Oak Ridge.

Two days before the first A-bomb drop on Japan (Aug. 6, 1945), he married Ruth Leonard. "The *New York Times* stories a few days later finally made it possible for me to tell my bride what I'd been working on," he recalls.

After earning an MS from Columbia, Dick began his PhD work at the University of Minnesota and received his degree in physics in 1950. "I'd started out believing I wanted to teach, but seeing the way young faculty members were treated made me decide I wanted to go to a laboratory," says Dick. "So, although I'd still never heard of Sandia, Ken Erickson had no trouble recruiting me away from academia."

. . . And into Sandia's Research Organization, a directorate headed by Robert "Pete" Petersen and located in what was then "the West Lab" (it's now KAFB Officers' Club West). Dick was a staff member in the electro-chemical division, with Ken as his department manager.

"It was 'nuts and bolts' physics," Dick recalls. "I was working on contact fuzes for nuclear weapons, a new concept at that time.

"Then, in 1953, I was appointed supervisor of the Experimental Research Division and, in my opinion, achieved two successes — I recruited George Anderson [ret.], who started work on analyzing firesets and detonator circuits, and Frank Nielsen [dec.], who really tore into that problem. I was particularly proud of that because it was an area Los Alamos had been working in and Sandia just ran away from them, all because of Frank's insight." (See "Recruiting" story.)

Dick's also proud of having invented, in 1954, a new initiator, which ended up being used in the W33 weapon. Shortly after that, Frank came up with explosive-to-electric transducers, both ferroelectric and ferromagnetic. "Again, it was because Frank really understood what was going on," Dick notes. "Other people had failed because they hadn't understood the physics involved. That was the antecedent of a lot of work, some of which Sandia still does."

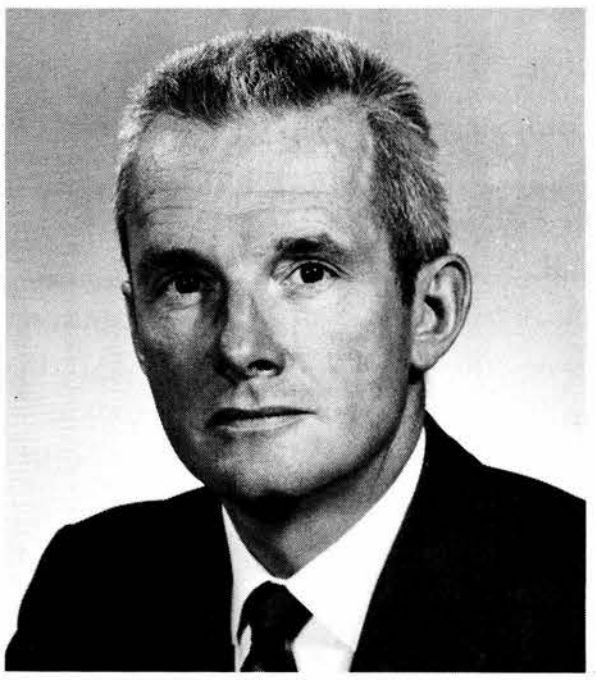
Research at Sandia was beginning to pay its way.

'Laydown' is Feasible

By summer of 1954, Walter McNair of Bell Labs had become Sandia's first Vice-President of Research, and he pushed to get his organization directly involved in the evolution of a weapon. "I was asked to head a new weapon program that would demonstrate that 'laydown' was feasible — and, in the process, demonstrate that research could prove a new weapon concept," says Dick. "Laydown means releasing a weapon at very low altitudes and very high airplane speeds, then have it lie on the ground and wait for the delivery aircraft to escape before detonating. In other words, you don't just drop it, you lay it down.

"The concept had been around for several years, ever since the big yields showed up," Dick continues. "But there were some real problems. One was that the weapon would have to be slowed down. That meant parachute retardation — it's hard to believe today, but in 1954 a lot of people believed that a nylon chute coming out of the airstream at Mach 1 would burn up.

"Another was, even if you succeed in slowing the weapon down to just 60 or 80 feet per second, how do you cushion the impact when it hits the target? And how is the warhead inside going to stand that shock? After all, the longitudinal g load then allowed on the two-stage weapon was 7.5 g's — pretty delicate.



DICK CLAASSEN, the early years.

"The latter problem was taken on by what was then the University of California Radiation Lab [now LLNL]," Dick says. "They committed themselves to design a nuclear device that would withstand 1500 g's.

"Sandia's aerodynamicists, Alan Pope [ret.] and Randy Maydew [1550] and many others, got together with Air Force chute experts, most of them Germans. And our systems organization built a test vehicle just for parachute drops and instrumented it in a way that the Air Force had never done — in the back of it, we put two high-speed cameras that filmed the chutes during release and filling. So Sandia had the first photos ever taken of a high-speed parachute actually opening. We could study the photos and learn where the rips occurred and all kinds of other details. I think that Randy will agree that it was this laydown bomb program that gave our now-famous parachute lab its first real impetus.

"My division worked on developing the shock-absorbing mechanisms. The problem is that the bomb doesn't come down in a predictable fashion, especially if there's a wind. So out in Area III we built a 300-ft. drop tower and attached a cable to the top that extends out at 45 degrees. You slide the weapon down the cable, and it starts getting cross-wind velocity. Then you drop it off, and gravity takes over. It really provides a typical impact of a large body dropping in the wind.

"What came out of those studies was that there were several ways to cushion the impact when the weapon hits the ground: A spike on the nose of the weapon gives you two advantages — it's a thin body so it doesn't generate much g force, and typically the spike just sticks in the target so you don't have any tumbling. Another good shock absorber is honeycomb, although it doesn't give the weapon any protection against tumbling or "slapdown" [after the weapon lands on its nose, it slaps on its side, creating a second impact and a lateral g load]." The group also tested a hydraulic, shock-absorbing tripod apparatus.

And the program was successful: Beginning with the B43, every high-yield bomb in the stockpile has been a laydown.

Fundamental Research Begins

By 1957, Glenn Fowler (ret.) had become Research VP. Glenn established a FOG, a "four o'clock group," that got together for an hour each afternoon (work hours were 8 to 5 then, at least in the winter months during those pre-daylight savings time times). "At the time, there was no basic research — we called it 'fundamental research' — going on at Sandia," notes Dick. "Glenn asked Frank Hudson [then a staff member in Dick's division, since retired] and me to

(Continued on Next Page)

(Continued from Preceding Page)

Claassen

develop a plan to create such a group.

"The time was right. Sputnik was in the air, and 'fundamental research' was the buzzword of the day. In addition, Glenn knew and respected a man named Dale Corson. Dale and Glenn had been among the very first supervisors [then called group leaders] when Los Alamos moved a contingent of people to Albuquerque after the war.

"In the mid-50s, I think it was, Dale became chairman of the Physics Department at Cornell, but the two didn't lose touch. Dale pumped Glenn up on how important it is for labs like Sandia to participate in fundamental research, instead of just exploiting what other institutions were doing. Glenn wasn't hard to persuade — Dale really just reinforced Glenn's interest in the subject.

"So with Glenn's enormous support, Frank and I developed a plan for a fundamental research department. We picked out research specialties in terms of their importance to Sandia weapon programs. One was defects in semiconductors, that is, how the radiation effects of counterweapons caused semiconductors to malfunction. Another was radiation effects in general. Still another was physical electronics related to switching devices and neutron generators. We planned a group in chemical kinetics because we were involved in pyrotechnics. And even at that time there was some talk about plasma energy systems so we planned a group in plasma physics.

"Once we — Glenn and Frank and I and the other members of the FOG — were satisfied with our fundamental research proposal, I was chosen to make the pitch to President McRae, and we quickly got his support. Soon after that, Mervin Kelly came to Sandia for one of his biannual visits, and they stood me up to convince him that Sandia should create a fundamental research program.

"Now, Mervin Kelly was President of Bell Laboratories and an extremely remarkable man — very smart amongst a set of very smart people. He was one of the people involved in AT&T's becoming Sandia's corporate parent [see LAB NEWS, June 19, 1987], and he was on Sandia's Board of Directors for quite a while — chairman part of that time. So he took a very active interest in Sandia. He always came to Sandia for two full days of briefings before Board meetings began.

". . . And a phenomenal memory! Someone would start to brief him by saying, 'On this fireset, we . . .' and Mervin would interrupt — 'Don't tell me that. You told me that a year ago.' Not only facts, but faces too: During a tour, a division supervisor he'd met a year or two earlier would walk by, and Mervin would say, 'Hello, George.' Got the name right every time.

"So this was the man I was briefing on fundamental research at Sandia. When I finished, he said, 'I certainly agree you ought to get into such a program at Sandia.'

1962 PHOTO shows Dick Claassen, then Director of Physical Research 5100, and Frank Hudson, then manager of Physical Sciences Research Department 5150, discussing the progress being made in hiring new PhDs into the directorate. Both played major roles in creating a "fundamental research" program at Sandia.

" 'Fine,' I said, 'but there's no point in starting if we can't carry it on for a good many years.' " And, obviously, the program has gone on ever since.

On to Department, Directorate

In the fall of 1957, Dick was chosen, likely to no one's surprise, manager of the new Fundamental Research Department, with Frank Hudson and Gordon McClure his two division supervisors. Other department managers in the directorate were Tom Cook, George Hansche, Alan Pope (all since retired), and Woodrow "Woody" Bledsoe (now head of MCC Technology in Austin, Tex.).

"During the time I was heading the department and later the Physical Research Directorate [57-68], I got just astounding support from each one of the research VPs and each one of the presidents," Dick recalls. "And, really, that's surprising, because it takes a long time to build a research group — 1100, for example, is still on a growth curve. So there was a long period of faith that the effort would prove to be worthwhile.

"I don't know of any other organization in the country that set out to create such a group and then stuck so closely to its original plans. That's what was really remarkable about Sandia. I was just awed at the time.

"And that was the start of fundamental research at Sandia Labs," Dick continues. "Golly, lots went on! In the more applied area, Frank Nielsen came up with the quartz gauge for measuring shock pressures in solids. Orval Jones [20] and others in that group provided some new understanding of stress wave propagation in solids. Fred Vook [1100], who was one of the first to join the new group, was interested in radiation effects, so we got the Van de Graaff accelerator in Bldg. 803, and Fred and his people have followed that line and variations of it ever since. It was the start of our plasma physics work — we called it 'dense plasma focus' at the time; Ev Beckner [5000] worked on that. Bill Cowan [1220] of that group developed compressed magnetic field generators, which still play a role in, for example, pulsed power sciences.

"Part of the fun of that job for me was when I became director and George Dacey was my boss. In those two years [61-63], George never once criticized me, even though I know I screwed up a few times."

Colloquium Series Begun

In the mid-60s, Dick was instrumental in beginning Sandia's Colloquium Series. The Series provides an opportunity for employees to hear a variety of experts discuss their technical fields. "I don't remember exactly where the idea for that program came from," says Dick. "Probably graduate school, where outside speakers were a part of the academic climate.

"But I do remember the first colloquium — the speaker was a Cornell professor, Henri Sack, and there were six people there, including me."

Dick set up the policy on what we would pay speakers and for many years served as final approval level for Series speakers. He also hired Crawford MacCallum (1271), longtime chairman of the colloquium committee.

Goodbye, Research; Hello, Components

In 1968, Dick lateraled to Components. "I was ready to move [see "Management Philosophy" story], and it was a good assignment. I had the radar, neutron generator, and two electronic components departments. They were all excellent development

(Continued on Next Page)

Management Philosophy: Simple but Effective

Dick's management philosophy — "management practice" is the term he prefers — is simple: Rotate and delegate.

He's a firm believer in both. And not only for others. His one regret, in terms of his career, is that "I stayed in Research at least a couple of years too long.

"When you go into a new organization, you have ideas and concepts and you can really contribute," Dick explains. "But once those contributions are incorporated, the opportunities for learning drop off, and you're left with just a day-to-day operation. My problem was that I had too much paternal interest in a research group that I felt I had personally built up.

"But once I was transferred to components, I realized the value of rotation for both the individual and the Labs — so much so that I had a plot made of how long each supervisor had been in essentially the same assignment. In many cases, I was appalled at how long that was. I firmly believe that people who spend too much time in one job risk stagnation, burnout.

"So, over the next couple of years, we moved many of them. Some were unhappy, but the overall organization and most of the people involved benefited a great deal.

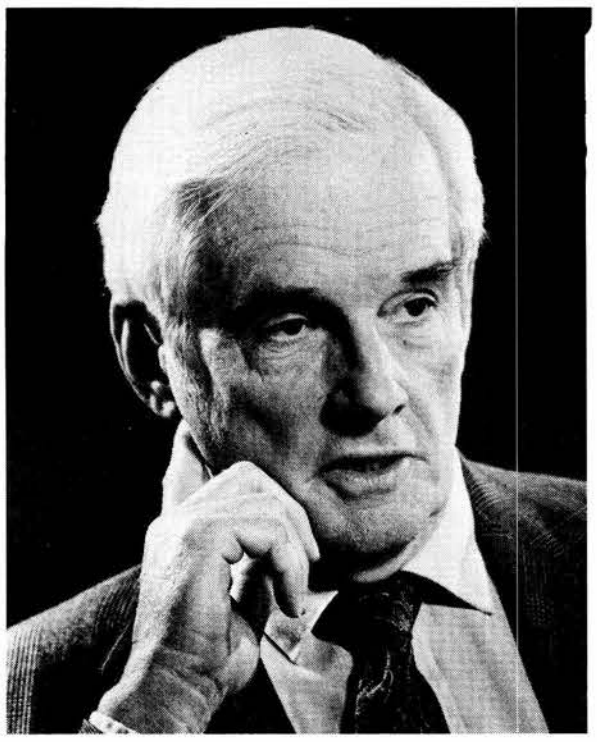
"Well, ever since then, I've moved many times and I've pushed for others to do the same. In fact, each year during rate review, and at other times, I've asked, 'Isn't it time for this person to move? What kind of shuffle shall we make?' In other words, I see rotation as absolutely essential to career development. Staying in the same job for many years while still maintaining a high degree of proficiency is, in a sense, swimming upstream. Some can do it, yes, but not very many.

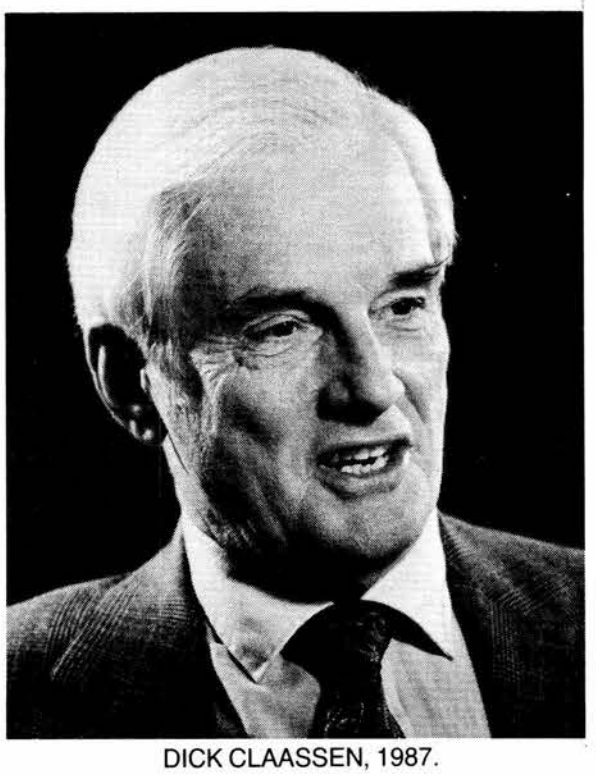
"One of the advantages of Sandia Livermore is that my predecessors had done better at moving people around than typically has been the case in Albuquerque. Rick Wayne [8400] is a classic example — he's been in research at both locations and in component development, systems development, solar, and systems analysis at Livermore. It's really hard to find anyone at Albuquerque with that diversity of experience."

The other career development technique that Dick has practiced is delegation. "I've been a sincere believer in developing the employees I've managed over the years," says Dick. "I think I got some of that from Glenn Fowler, who was particularly good at it.

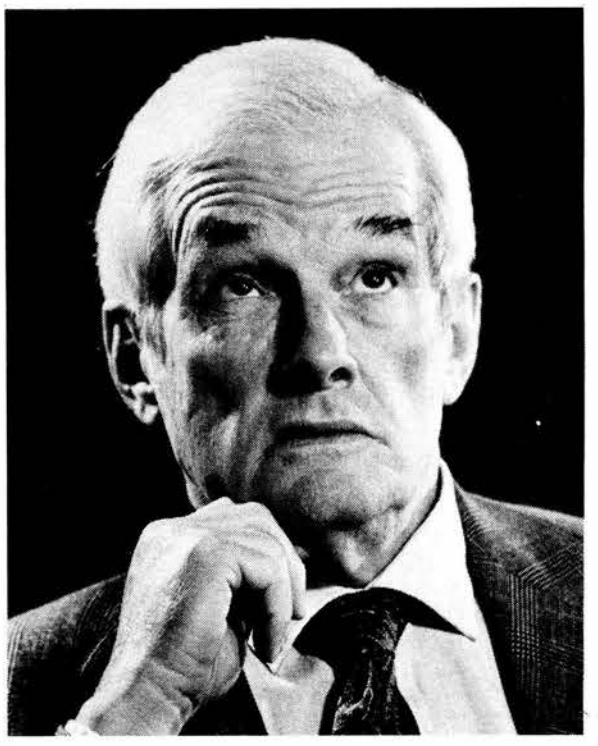
"So I've really tried to assign responsibilities to the people who report to me, and I've tried to set it up so they have the resources and the authority to do the job well.

"I think most of the people have enjoyed the freedom, and I know it's the right way to train people. I take pride in the fact that a lot of people who used to report to me are now doing very well." (See "Recruiting" story.)





DICK CLAASSEN, 1987.



(Continued from Preceding Page)

Claassen

groups with a sound technical base. Bob Henderson was the VP, and John Hornbeck was the President.

"John was pushing to create 'Centers of Excellence' within Sandia," Dick continues. "One of the groups proposed as a Center was my neutron tube department. So, first under Charles Tapp [5140] and later under John Crawford [8000], we set up a committee with members not only from the department but also from Research and from Livermore.

"It proved to be a very effective way of getting strong interaction among the groups involved," Dick goes on. "It provided a focus for some research activities, allowing the researchers to do something that was both good research and vitally important, and, of course, improving the quality of neutron tube design at the same time."

A long-term push toward miniaturization of components and the newer impetus of a thriving Center for Excellence resulted in what was called "the one-pound neutron generator." "Generators today don't look much different from that one," Dick notes.

Another Center of Excellence success was a gas reservoir Center based in Livermore. And there were other Centers, but, according to Dick, they were not as effective as these two.

The Centers of Excellence concept was one example of John's push "to make Sandia a stronger technical place," Dick recalls. Sometimes Dick got caught in the crossfire: "The Field Test people had all these instrumentation trailers that were getting out of date, so they worked out a big master plan to buy one new trailer each year with capital funds. So a thick package with all the supporting evidence for the year's new trailer arrived for Hornbeck's approval of the, say, $300,000 it was going to cost.

"He walked into my office [where Org. 400 is now located], threw the package on the table, and said, 'Dick, could you use $300,000 more of capital equipment?'

"I said, 'Well, yeah, I think so.'

"And he said, 'Can you give me a list in a day of what you'd buy?'

"I said, 'Well, yeah, I think so,' and we worked up a list of equipment we needed. And, by god, he gave me all the money from the trailer! I told Byron Murphey [a Field Test director, now retired] that I felt kind of sheepish about helping torpedo his program."

It was under Hornbeck that Dick headed a committee — Bob Peurifoy (7000), Arlyn Blackwell (400), Randy Maydew (1550), Homer Pierce, Hank Willis (both ret.) and Lou Berry (ret. and dec.) — that reviewed the needs of Sandia Livermore in 1968. From the committee's recommendations, Hornbeck chose to add an applied research component to SNLL. Tom Cook became Livermore VP shortly thereafter and promoted Jim King (7400) to implement the new program.

"It was during one of the committee's visits to Livermore that Tom and others pointed out to me that they needed more property than the narrow slice they had been on since they were formed in 1956 — and that a million bucks would buy a big piece of land east of them," says Dick. "I came back and personally told Hornbeck that Livermore needed that land, and we ought to get it bought. Charlie Campbell [then the controller, now deceased] happened to be in Hornbeck's office, and Hornbeck said, 'Yeah, let's do that, Charlie.'

"And Charlie said, 'We can't do that, John. We don't have a million dollars.'

"And Hornbeck responded, 'Ah, hell, Charlie, by the end of the year, you don't even know where you are within a million dollars.' Next thing I know, the land was purchased — and lucky for Sandia it was." (The land is now the site of the Combustion Research Facility.)

It was under John Hornbeck's leadership that Sandia began moving toward something of a hands-off policy with respect to the integrated contractors, the manufacturing and production arm of the nuclear weapon complex. Sandia had traditionally been responsible for several activities at the "front end" of the manufacturing cycle (establishing relationships with suppliers, for example). "In Sandia's opinion, such things were more properly done by the manufacturing locations themselves," Dick recalls. "And, as the Components Director, I was quite involved with that long-term change."

It was also in the early 70s that Dick was asked by Small Staff to do an overview of process development at the integrated contractors. "One example of process is welding," Dick explains. "For a particular kind of metal, you've got to know how hot to make it, how much current to draw, what kind of rod to use to add material to it, and so on.

"In that case, and in many others, I was trying to ensure that we were providing all the support they needed — and that we were getting our fair share of the special funds each of the plants receives from the Albuquerque Operations Office to develop the

(Continued on Next Page)

Continuing Involvement in Continuing Education

Dick has been interested in education, and involved with Sandia education programs, throughout his career. SURP (Sandia University Research Program) traces its origins to 1957, when Sandia had a budget problem that caused it to cancel several contracts around the country, including some at UNM. "When that happens, it's just disastrous for a campus," says Dick. "So Dick Moore, a former Sandian who was then chairman of the EE department at UNM, talked to President McRae about setting up an ongoing cooperative research program that would not be subject to budget cuts — during a school year, at least.

"McRae agreed, and he asked me to set up and run the program with Frank Hudson as my sidekick. We interviewed each science and engineering department to identify prospective research areas of general interest both to faculty members and Sandia. Then we reviewed the specific proposals UNM made in supporting new faculty members and their grad students for the first couple of years, until they could get some ongoing support from Washington. I chaired that program for 10 years, and served on the committee for another 10.

"Shortly after that, our new President, Julius Molnar, formed an Education Committee with Glenn Fowler as its chairman," Dick continues. "I was one of the members, and I tried to be, with some success, the most active director on that committee over the years.

"One of the achievements from the early period that I'm most proud of is that I worked closely with UNM to establish the curriculum for the Technical Development Program." (TDP allowed an MTS to hire into Sandia with a BS, then spend half-time in graduate-level classes at UNM and earn an MS.)

In 1976, Dick was named chairman of UPEC, the University Programs Education Committee, and was on that committee until he moved to Livermore in 1982.

It's no surprise, then, that Dick believes strongly in the value of continuing education to Sandia: "The entire strength of the Labs is built on the quality of its people and the competency of its management. If we were to say that we don't need the best people we can find, the Labs would just plain slide downhill; we'd end up doing mundane jobs for whoever would hire us.

"So even if we now hire lots of people with PhDs, maybe with postdoctoral work, we've got to remember that the education is merely an excellent *start* on a career. Once they're hired, formal classwork is by no means the only route to becoming the kind of person Sandia needs — some people can simply get a book and apply it for themselves. But education programs are the only way for those who prefer the discipline and formalism of going through a learning process in a regular class structure.

"We're trying to press technology in almost all the programs that we work on. That means that our staff has to be at the leading edge of whatever field they're operating in. And *that* means they still need to make a great effort to keep right up with what's going on. Ongoing education is absolutely essential at Sandia."

CAN'T WIN 'EM ALL — 1953 photo shows the "two top teams in the Sandia Corporation Golf League." From left, the losers: Jim Sharp, Dick Claassen, and Phil Bush; and the winners: Claire Hicks, Bill Cowan (1220), and Dave Williams.

(Continued from Preceding Page)

Claassen

processes needed for new designs. Later, when I was Director of Materials and Process Sciences, we set up an open house for the contractors so they could see what was going on at Sandia.

"All in all," Dick says, "it made that lab-contractor interface an efficient one."

Back to Research

In 1975, Dick was assigned his third position as a director, this time in Materials and Process Sciences, then, as now, a directorate within the research vice-presidency.

"I enjoyed that assignment very much," Dick reports. "That organization has a heavy element of direct program support, which is to say a great deal of 'practicality' in relating to the design and systems people around the Labs.

"I reported to Al Narath, who was busy getting us into energy programs, so he pretty much left me to my own devices. I had been given, at least implicitly, a charter to strengthen the organization through recruiting — and all you have to do is to look at the group now [1800] to see that we were very successful; we brought in a substantial number of new people, very well-trained, yes, but also quite willing to spend part of their time going out to a manufacturing facility and working on practical problems.

"Looking back, I'd like to think that both my components and my materials assignments helped to strengthen the interface between the Labs and the integrated contractors with regard to processes and materials.

"We also significantly improved Sandia's ceramics group," Dick continues. "Bob Eagan [1840], Ed Beauchamp [DMTS, 1845], and a couple of other ceramists were already there, but we brought in several other very good people. And that group is now getting national recognition for the quality of its work."

Career Climax: SNLL VP

By 1982 Dick had spent 22 years as a director. When, under George Dacey, Sandia brought Tom Cook back from Livermore as an executive vice-president, Dick was chosen to fill Tom's slot. "I surely did appreciate getting promoted to Livermore," Dick states. "It's the best VP assignment in the Labs, not only in my opinion but in the opinion of others.

"It's the separate location, the autonomy, the opportunity to manage a whole complex of activities as opposed to a single technical line.

"But it's more than that — I always used to come away from my Livermore visits thinking it was a fine group. Then too, the timing was right in terms of our family — and, professionally, I was ready for a new challenge, something new to bite on. It was easy to accept the new position.

"And I certainly never regretted the move. I enjoyed working with the administrative, as well as the technical, people. And communication — getting the word out — is much easier in Livermore because you don't have the problems of crossing VP lines.

"So with those advantages, and with the going organization Tom left behind, and with tremendous assistance during my early period, it was a very smooth transition. At least it felt that way to *me* — I don't know how it felt to the others."

Dick's primary task at Livermore was, of course, to keep the place functioning smoothly and productively. But he had a few other agendas as well: "I wanted us not only to *be* good members of the community, but also to make that involvement understood by example. One of the ways we've worked to build our image in the community is to get positive stories of Sandians — Jim Smith's [8024] work to improve science and math programs in the local schools is an A-1 example — into the newspapers a little bit more than we used to.

"In other words, we've moved away from the old Western Electric attitude that 'the best year for public relations is the year you were never in the newspaper.' And for good reason — we've had, and we're going to have, incidents that are going to end up in the paper whether we want them to or not. So it's important to have positive stories that help to balance the negative ones. And the local reporters, Vince Kiernan of the *Tri-Valley Herald* in particular, have given a balanced view of the Labs. It's hard to measure success in areas like this, but I believe our approach is working."

Two Sandias?

"Another agenda — in fact, about the only specific direction George Dacey gave me when I came to Livermore — was to reduce the 'two Sandias' prob-

(Continued on Next Page)

Great Thing Inherited from Bell Labs

Professional Society Membership Benefits Employee, Sandia

In addition to the continuing education programs Dick's been involved with (see "Continuing Education" story), he's also pushed the technical staff to become active members of professional societies.

"As Sandia gets better and better — which it is — I think it's more and more important that we have people on our staff who are recognized nationally, even globally, as experts in their fields," Dick notes. Generally, he points out, this recognition is achieved by becoming active in societies — leading seminars, giving invited papers, getting appointed to policy-making committees of the national academies, and the like.

Why should Sandia encourage that kind of involvement? It's good for the Sandian, Dick believes; that is, work in a society is both educational and fulfilling. And it's good for the discipline, contributing to the spread of the relevant knowledge.

But it's also good for the Labs: "One of the great things that we inherited from Bell Labs is that management has consistently taken the attitude that the improvement of the individual's professional stature is the improvement of the laboratory. That attitude — that we care about our employees' career development — really is one of the things that has helped build Sandia into a very strong laboratory."

One That Didn't Take

Science Seminar Successful — But No Series

One seed that Dick planted has never taken root. That was the Science Seminar Series.

It was 1963, and Albuquerque was hosting the National Science Fair. The New Mexico Academy of Science decided that a Science Seminar Series would be a fitting adjunct to the Fair. Irv Auerbach (1553) spearheaded that Sandia effort, but Dick, the Seminar chairman, recalls that he worked on it full time for nearly three months.

"We ended up with 800 high school students and 200 science teachers," Dick recalls. "They could go to six seminars, morning and afternoon for three days. The attraction was the speakers, 91 of them. Many were the leaders in their fields — two Nobel laureates, William Shockley and Willard Libby; [Air Force] General B. A. Schriever, who had been responsible for the development of ICBMs; Col. Chuck Yeager, well-known test pilot; City College of New York Professor Mark Zemansky, who spoke on superconductivity; Col. John Stapp, the first to reach Mach 1 on a rocket sled; and many other experts.

"Then in the evenings, we had talks for the whole group by people like Glenn Seaborg, chairman of the AEC; Wernher von Braun, director of the George C. Marshall Space Flight Center; Navy Admiral Hyman Rickover, father of nuclear submarines; and, of course, Edward Teller.

It was an exciting week for the students and for Sandia too."

Unfortunately, the state holding the National Science Fair the following year didn't choose to repeat the Science Seminar — "perhaps because it didn't have a sponsor like Sandia available," says Dick. "It was, admittedly, a lot of work."

(Continued from Preceding Page)

Claassen

lem, push the 'one Labs' concept,'' Dick continues. ''Well, Livermore and Albuquerque are two groups in separate locations; they're going to be distinct; they're going to have separate alliances. After all, different vice-presidencies within Albuquerque don't get along entirely without substantial differences of opinion, even friction sometimes. And each place needs a degree of self-identity; that's healthy.

''But I did work on the problem. Basically, it's a matter of encouraging all the people in Livermore to establish and maintain close ties with their counterparts and contacts in Albuquerque, and vice versa. I couldn't do much about the 'vice versa.' of course, but I chipped away on the Livermore end.

''And I think we made some progress. I don't think we have as serious a problem as we had five years ago. But, of course, that too is hard to measure.''

Incidentally, Dick's license plate, '1 SANDIA,' is a pun based both on Dick's No. 1 spot at SNLL and his charter from George Dacey.

Advice, Warnings for Successor

Dick's term of office overlapped with that of his successor, John Crawford, by a month. One of the many tips he passed along to John was simply to keep an even attention on the various elements of the Livermore operation. ''That's important, but it's really hard to do,'' Dick notes. ''Your personal interests get in the way; then too, you tend to chase the problems and neglect the areas that aren't in any trouble.''

In a local newspaper interview, Dick predicted that John's stint as SNLL VP may be ''much more turbulent'' than his own. He cited ''the uncertainties of the budget, the uncertainties of the nuclear weapon program, the possibility of major changes because of disarmament agreements or test agreements.'' He also mentioned that John, like the heads of other DOE labs, will have to cope with increasing scrutiny by federal and state governments in environment, safety, and health areas.

But he feels SNLL is in good shape and will meet the challenges it faces: ''We have a tradition at Sandia, one that we've tried hard to impress on all our people. That is that integrity is fundamental. It's that underlying integrity that I believe will carry us through any tough times ahead.''

Ahead: Intense Relaxation

Dick and Ruth have moved into a new house ''under Mt. Diablo'' in Blackhawk, northwest of Livermore. Both are looking forward to a relaxing retirement — traveling (a five-day bike tour of Vermont during fall foliage time is on the agenda), golf on the Castlewood course, sailing on the Bay, skiing in the Sierras. And Dick wants to get back into building furniture, maybe try some barbershop singing.

''Those are the kinds of thing I'm looking forward to for the first six months or a year,'' says Dick. ''The only other thing I've committed myself to do is to chair a new advisory committee for the Materials and Science Department at the University of Florida in Gainesville. Then, if I find I'm missing more intense activity, I'll probably check with the local universities. Maybe they'd like some help from someone who doesn't have to be on the payroll.

''And I may follow up an inclination to do what I can in the way of promoting technology transfer. California has a marvelous collection of sources of technology and some fine colleges and universities. But there's the usual problem of establishing connections among them. I may want to do something to help those groups connect.''

And why California for someone who lived in the high desert for 31 years? ''We got spoiled out here. Love the weather. Ruth never did become a desert person, and she loves it here. And I've found this place extremely enjoyable — especially the wide variety of activities.'' •BH

"WHAT AM I GETTING INTO, TOM?" — In 1982 Tom Cook returned to Albuquerque as an executive vice-president, and Dick Claassen took over the top spot in Livermore.

feedback

Q. When Congress debated the merits of designating Martin Luther King's birthday a national holiday, it was clear that its members considered the impact on businesses. At that time, the decision was made to celebrate it as a holiday, even if a workday was lost. Congress perceived the importance of honoring that man's heritage by providing a new day of rest, above and beyond those previously enjoyed by Americans. It seems that Sandia has decided not to honor this intent. Why?

A. Sandia has a very generous ''paid days off'' package that includes 10 holidays, one energy conservation day, and 24 vacation days for a total of 35 days, or seven weeks.

To help you understand the Sandia position, let me relate some history. In 1974, Sandia observed the following holidays:

- New Year's Day
- Washington's Birthday
- Memorial Day
- Independence Day
- Labor Day
- Veterans Day
- Thanksgiving Day
- Christmas Day

In addition, each employee could choose one designated holiday: employee's birthday, employee's service anniversary, Good Friday, Columbus Day, Rosh Hashanah, Martin Luther King's birthday, Yom Kippur, or Friday after Thanksgiving.

In that same year, Sandia began the Christmas shutdown and required all employees to take vacation or leave without pay for 3-1/2 days. Half a day on Christmas Eve was added to the holidays in place, for a total of 9-1/2 days. This practice was continued in 1975.

Employees complained that forced vacation was unfair. In 1976, management decided to rearrange the holidays by eliminating Washington's Birthday and Veterans Day (both national holidays), and replacing them with two days during the Christmas shutdown. Then they eliminated the designated holiday (of which Martin Luther King's Birthday was an option), and replaced it with a day during the Christmas shutdown. The remaining half-day was added as a bonus for a total of 10 paid holidays. It is through this rearrangement of holidays that full pay is received during the Christmas shutdown.

We consider all three national holidays (Martin Luther King's Birthday, Washington's Birthday, and Veterans Day) to be important. However, the provision was made, and stands today, that anyone wishing to celebrate a national holiday on the specific calendar day on which it falls may do so by using A241 (vacation) if it falls on a regular workday.

Paul Stanford - 100

Q. Can something be done to discourage the people who drive the wrong way down the lanes in the parking lots south of Bldgs. 822 and 823? They are endangering and irritating the rest of us just to save themselves a few seconds.

A. The direction of travel in SNLA parking lots is dictated by placement (diagonal) of parking spaces and/or signs and arrows. Employees seldom commit these violations when enforcement personnel are present. However, when violators are observed, their license number should be reported to 4-6410 (Enforcement Section). The offender will be contacted and counselled.

Jim Martin - 3400

Q. Now that studies indicate that secondhand smoke is harmful to the health of those non-smokers exposed to it, does Sandia intend to ban smoking in all office areas? Some companies (Mountain Bell, for example) have already done this. It seems ridiculous that Sandia spends the amount of money it does on the TLC program, yet does not make a stand about smoking in office areas.

A. Sandia's smoking policy was reviewed and established by Small Staff and published in the *Sandia Labs Weekly Bulletin* dated March 20, 1986. This policy prohibits smoking in a variety of areas including auditoriums, conference rooms, areas designated as hazardous for safety reasons, designated non-smoking areas in cafeterias, Medical facilities, elevators, and company vehicles.

Instead of proposing a company-wide smoking ban, Sandia has chosen to recommend that conflict between smokers and non-smokers in the workplace be resolved by the immediate supervisor. Sandia has also chosen to contribute considerable resources to a large-scale health promotion program; within that program smoking cessation is a significant component. It is interesting to note that smoking behavior at Sandia has progressively declined and is now substantially less than half of the national average. Our sense is that attempting to address smoking cessation from a broad perspective in an effort to help those at risk, i.e., smokers, is an important goal.

Although some companies have been successful in developing a total no-smoke environment for their facilities, this has not been universally true. A total ban raises a variety of administrative concerns and questions, and Sandia has chosen not to embark upon this path at this time. The smoking policy will undoubtedly be readdressed in the future.

Larry Clevenger, M.D. - 3300

Q. I am concerned that Plant Engineering is suffering from a paucity of imagination. Is the Bldg. 821 look-alike the Labs' quonset hut for the year 2020?

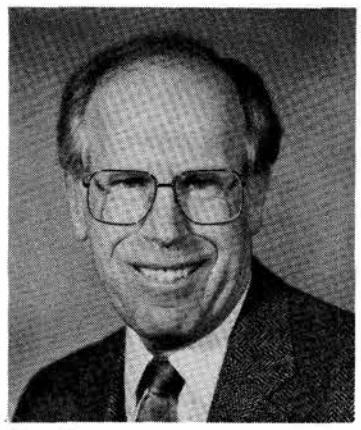
A. What you call ''paucity of imagination'' has been described by others as ''innovative construction planning and management.'' The reaction to, and acceptance of, Bldgs. 821, 823, and 891 has been quite favorable. I believe that these buildings are attractive, comfortable, functional, and are designed to easily and economically accommodate changing occupancy requirements. My impression is that ''everybody wants one.''

I agree that if we lined them up in rows there might be some chance to be ticky-tacky, but even though I have high hopes for look-alike number five in Albuquerque in the FY88 budget, I don't think that we need to worry about a slum caused by too many Bldg. 821 look-alikes in Tech Area I in the year 2020.

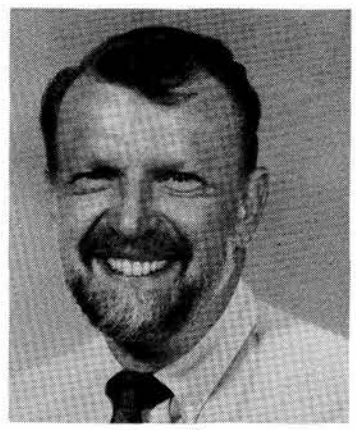
Ward Hunnicutt - 7800

MILEPOSTS
LAB NEWS

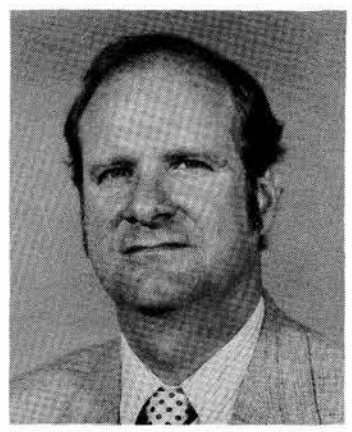
JULY 1987



Ken Prestwich (1240) 25

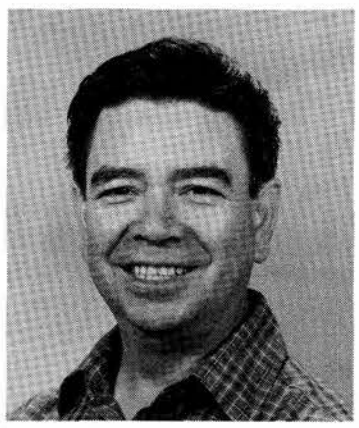


Jeffery Lawrence (9014) 20

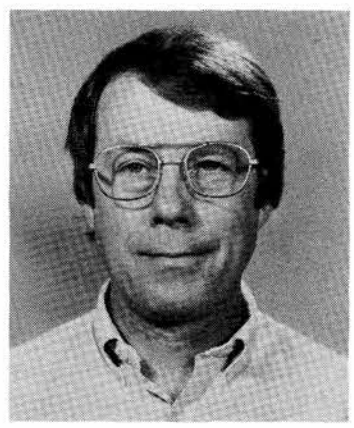


Curtis Hines (9010) 20

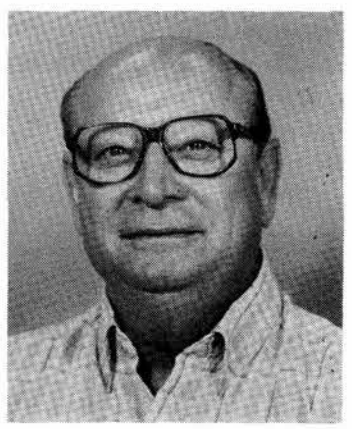
Lyle Whelchel (3712) 30



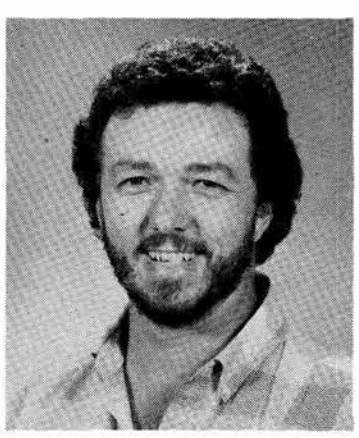
Ricardo Garcia (5238) 10



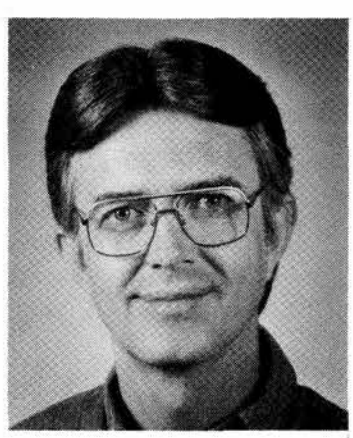
Nels Magnuson (7222) 25



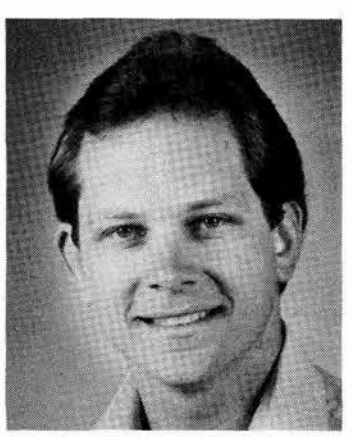
Carl Goodrich (2341) 10



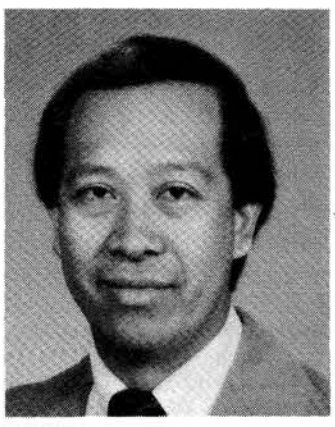
Fred Brown (7541) 15



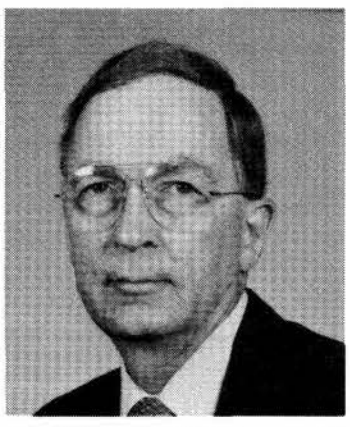
Charles Ray (8272) 20



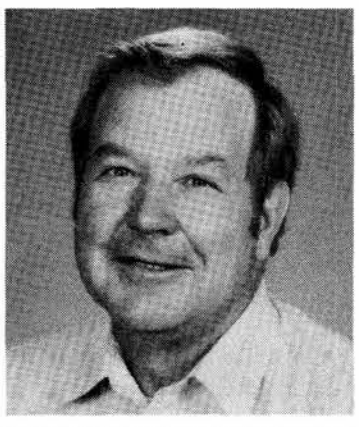
Ken Buck (8272) 10



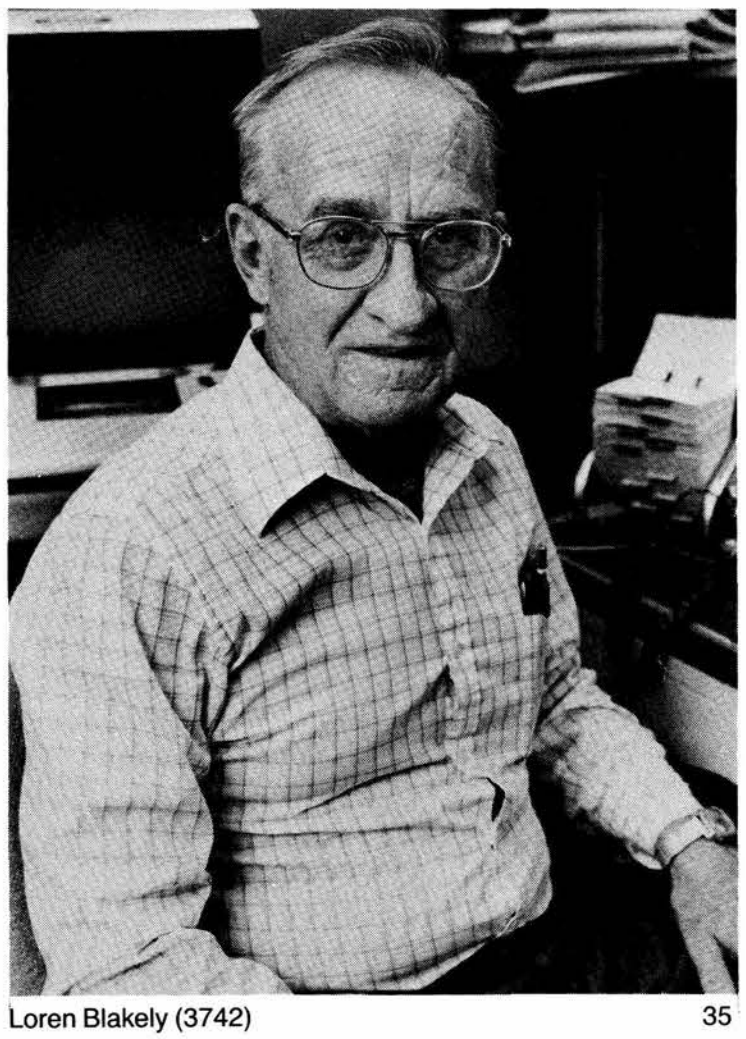
Bob Chan (8464) 15



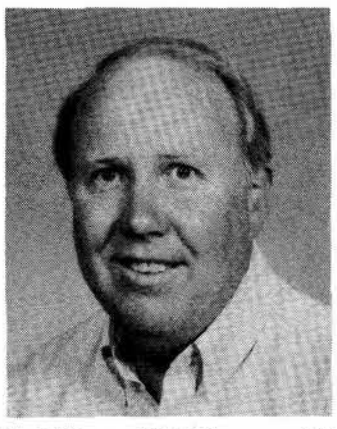
Ron Fugazzi (8025) 25



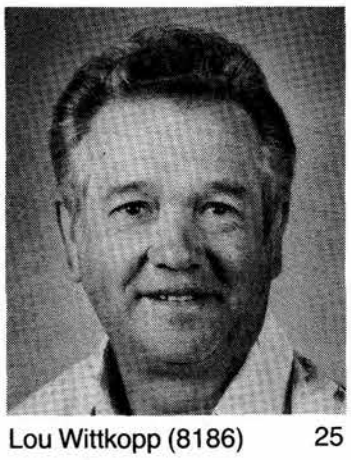
Larry Humphreys (8461) 25



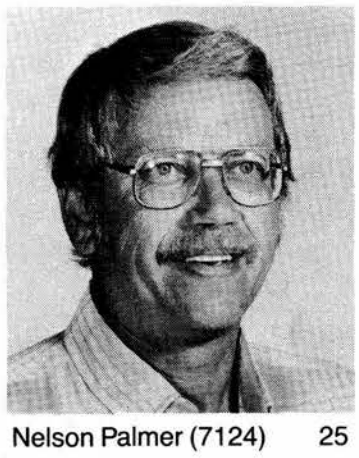
Loren Blakely (3742) 35



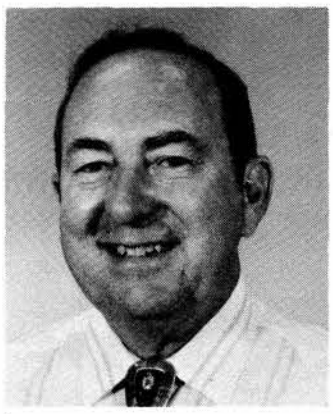
Rod Nissen (8441) 25



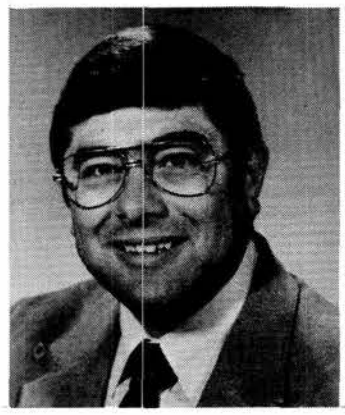
Lou Wittkopp (8186) 25



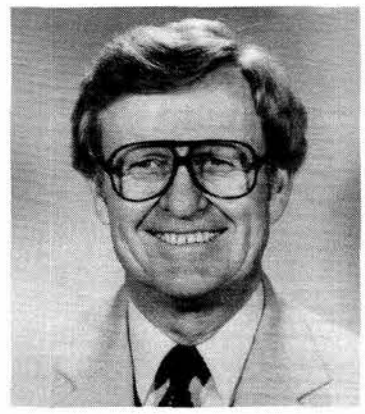
Nelson Palmer (7124) 25



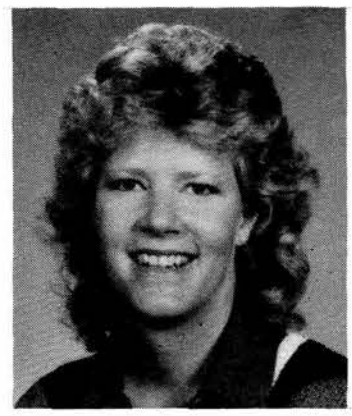
Bill Barton (1555) 35



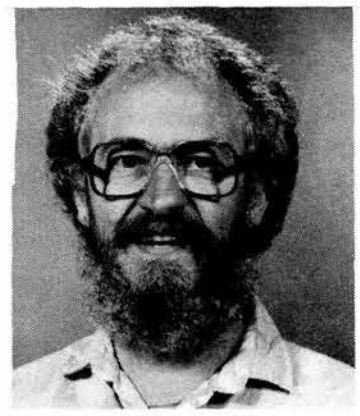
Joe Allen (7842) 20



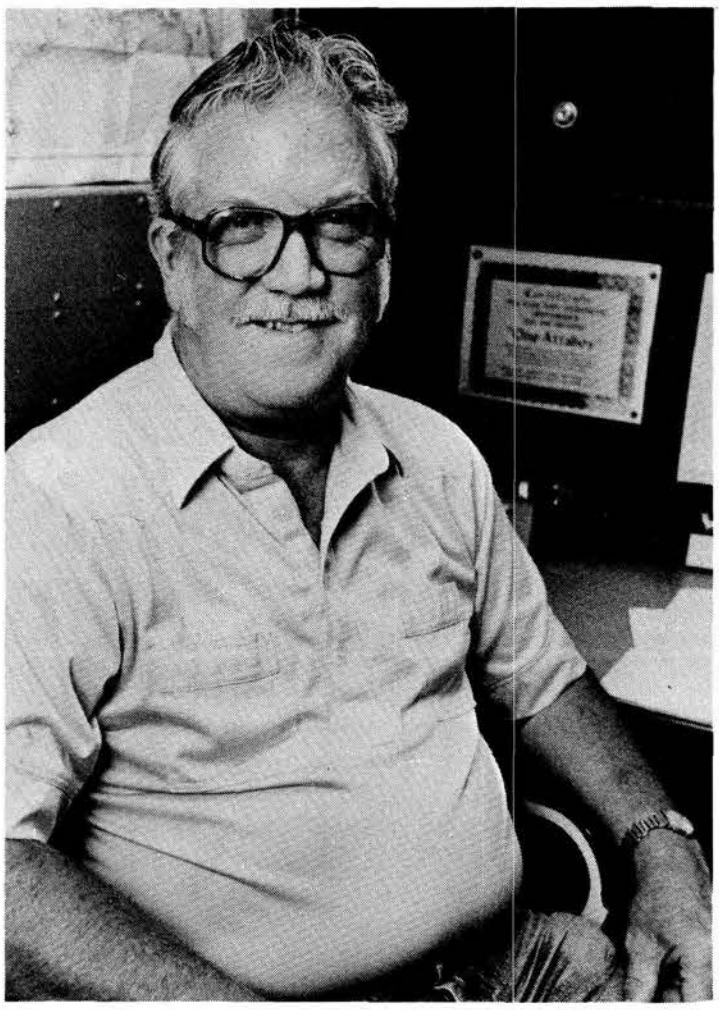
Dean Thornbrough (400) 35



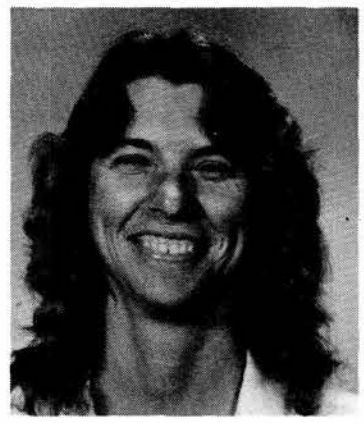
Linda Barncord (8235) 10



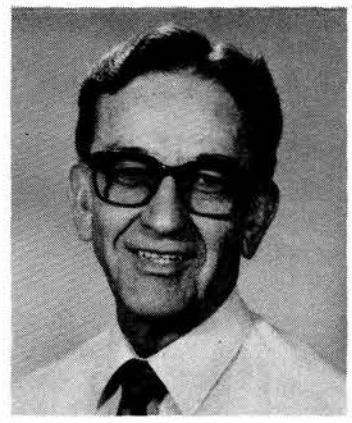
Dave Pierce (2361) 25



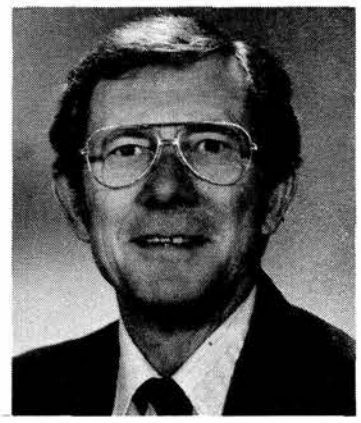
Harold Myers (7243) 35



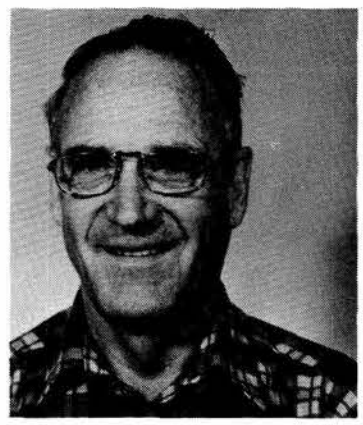
Gina Noack (1264) 10



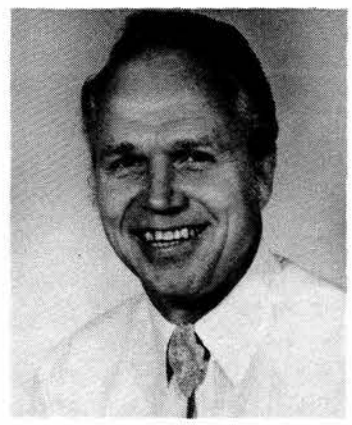
Neal Branson (2833) 35



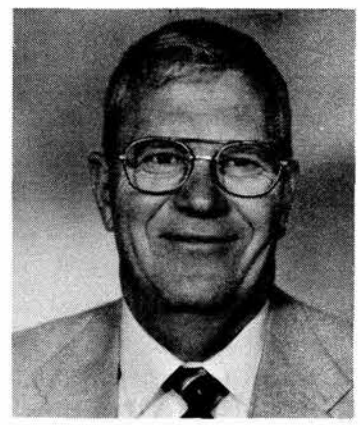
Jim Ridinger (DMTS, 7261) 30



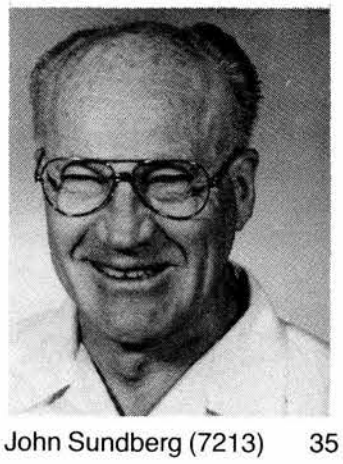
Ray Hinds (7521) 30



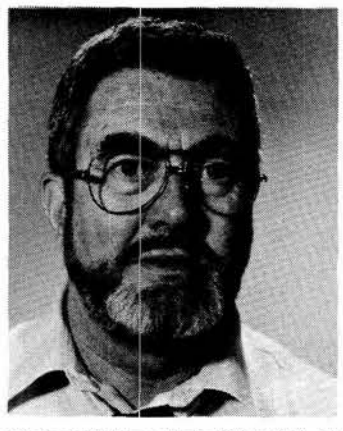
George Ingram (7234) 30



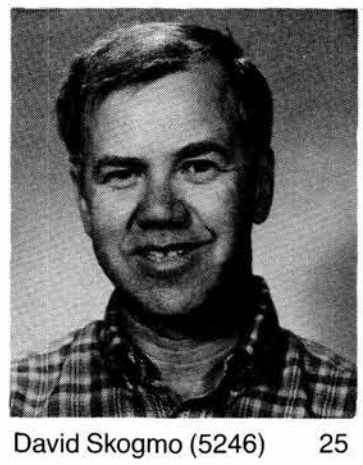
Frank Muller (7266) 30



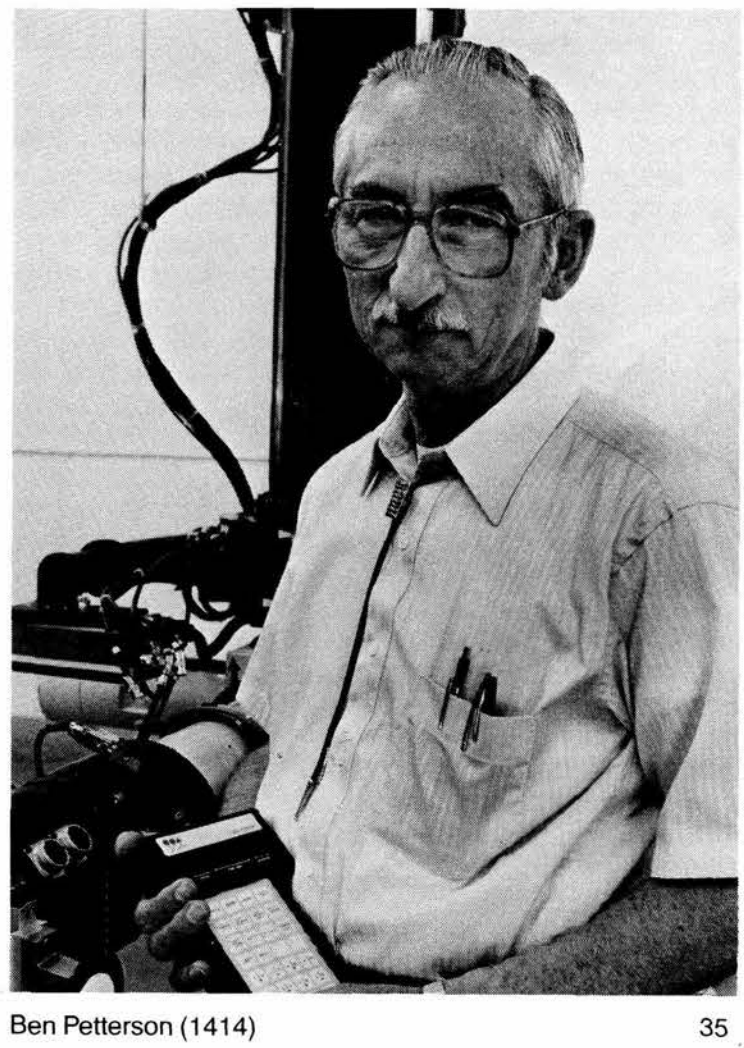
John Sundberg (7213) 35



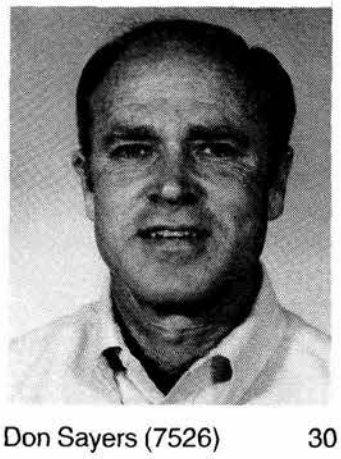
Richard Womelsduff (7241) 40



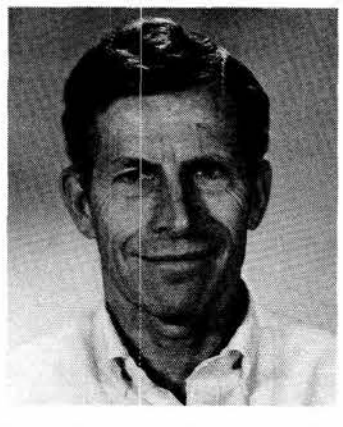
David Skogmo (5246) 25



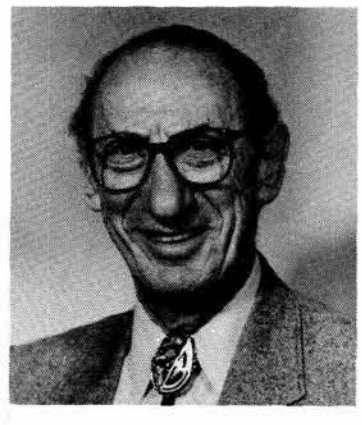
Ben Petterson (1414) 35



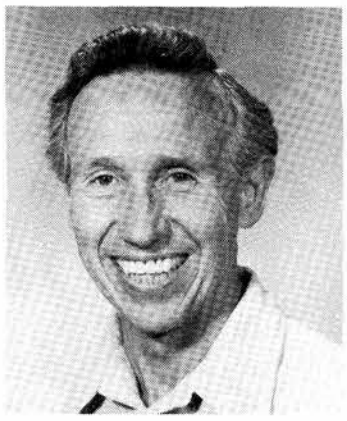
Don Sayers (7526) 30



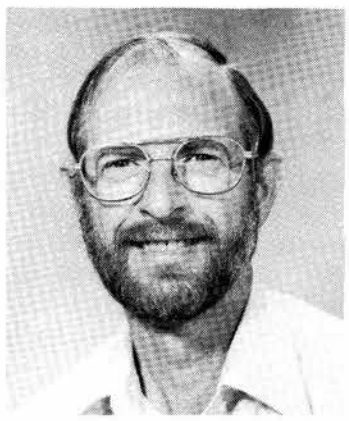
Jack Kidd (2613) 30



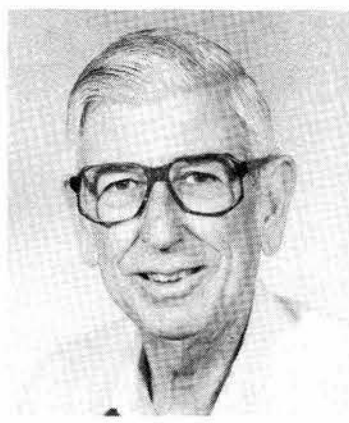
Herman Levine (1821) 30



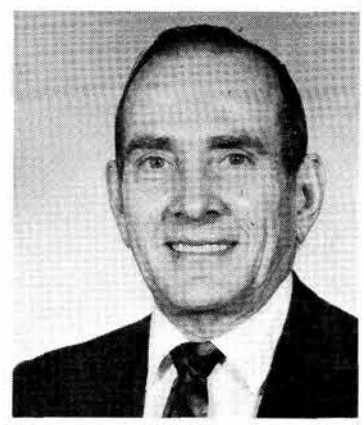
Don Bertholomey (5245) 25



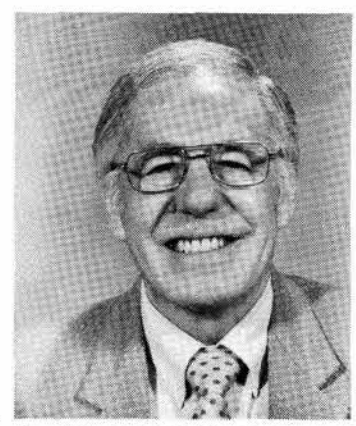
Dick Ericksen (1813) 20



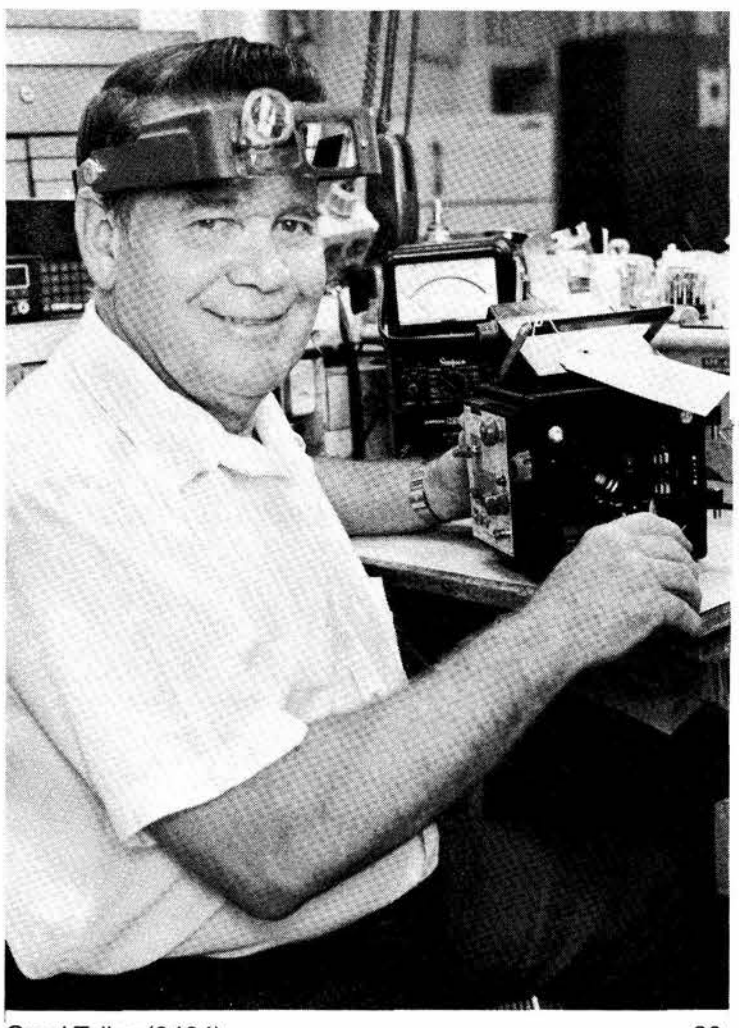
Pierce Brown (5153) 35



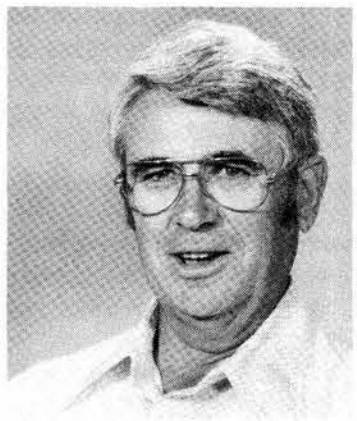
Al Winblad (5245) 35



Joe Black (DMTS, 1522) 30

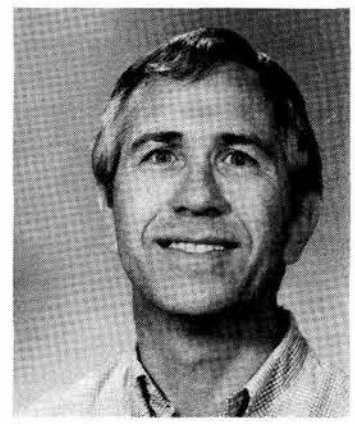


Orval Talley (3424) 30

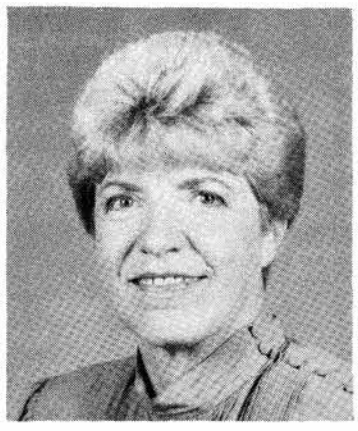


Dick Simmons (5262) 30

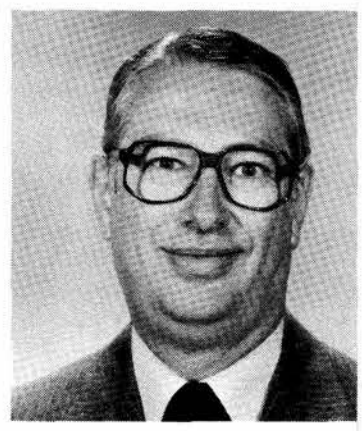
Carlin Newcom (9221) 20



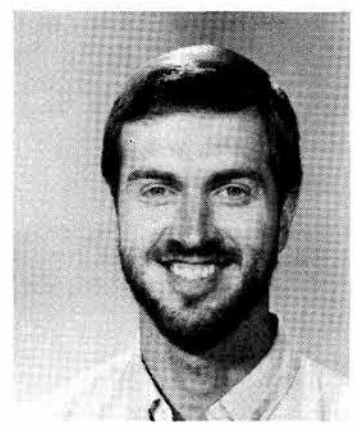
Dan Thompson (3313) 20



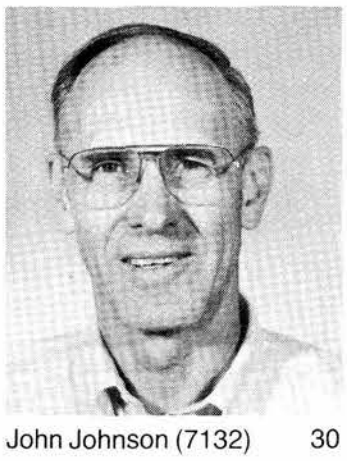
Jan Inzerilla (8025) 30



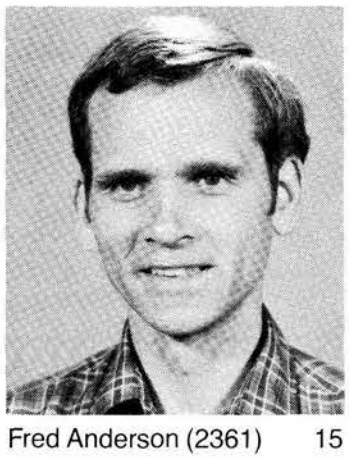
Harold Spahr (1551) 30



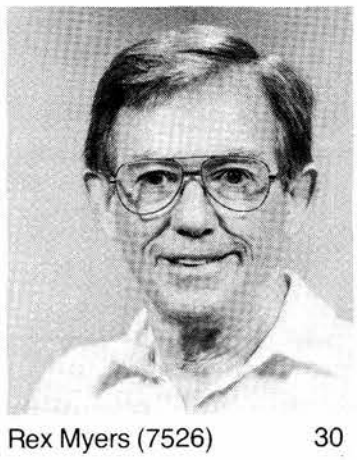
Arlen Weishuhn (5215) 10



John Johnson (7132) 30

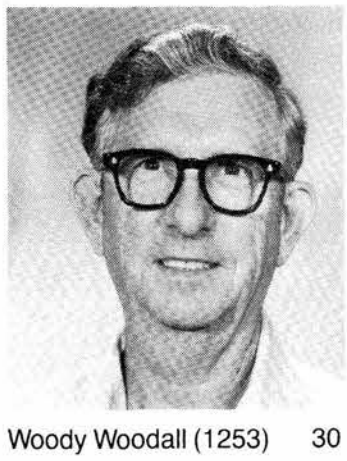


Fred Anderson (2361) 15

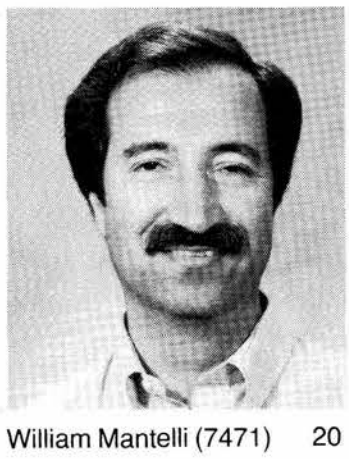


Rex Myers (7526) 30

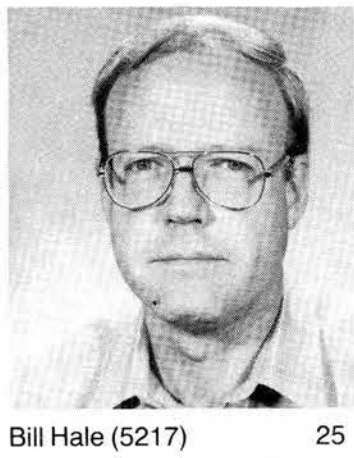
Betty Gatto (3543) 30



Woody Woodall (1253) 30

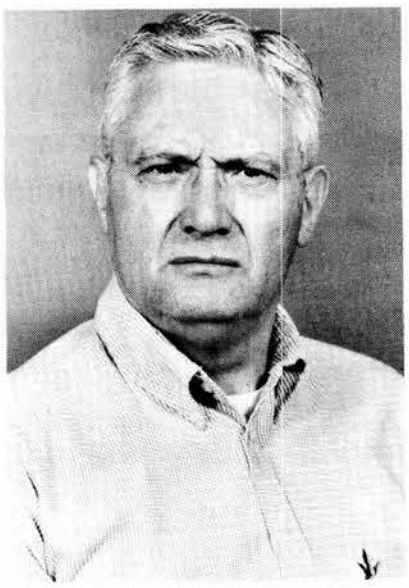


William Mantelli (7471) 20

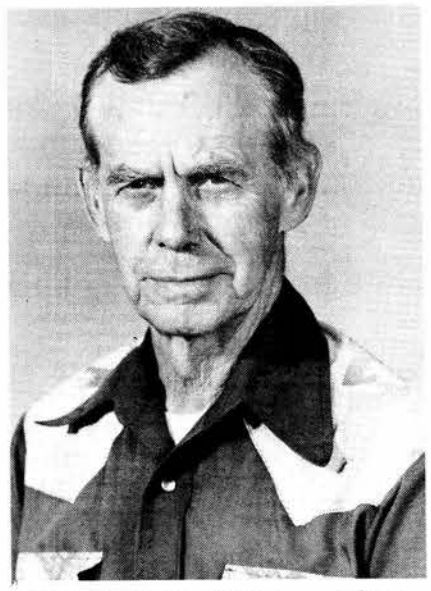


Bill Hale (5217) 25

RETIRING



Arthur Hylton (2858) 30 yrs.



Norman Smith (3414) 37 yrs.

Fun & Games

Ski Patrolling — Jack Cyrus (9112), leader of the Sandia Peak Ski Patrol, reports that the patrol is seeking recruits for next ski season, particularly skiers who can patrol one or more days during the week, Monday to Friday. Recruits must be strong skiers who have completed the Red Cross advanced first-aid course. Additional training in rescue toboggan handling, skiing, and "winterized" first-aid is given by the Patrol. Jack says many of the present week-day patrollers are spouses or children of Sandians. Call him on 898-4038, after 5 p.m., to sign up or for more information.

UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS

Deadline: Friday noon before week of publication unless changed by holiday. Mail to Div. 3162.

Ad Rules

1. Limit 20 words, including last name and home phone.
2. Include organization and full name with each ad submission.
3. Submit each ad in writing. No phone-ins.
4. Use 8½ by 11-inch paper.
5. Use separate sheet for each ad category.
6. Type or print ads legibly; use only accepted abbreviations.
7. One ad per category per issue.
8. No more than two insertions of same ad.
9. No "For Rent" ads except for employees on temporary assignment.
10. No commercial ads.
11. For active and retired Sandians and DOE employees.
12. Housing listed for sale is available for occupancy without regard to race, creed, color, or national origin.

MISCELLANEOUS

TLC T-SHIRTS, new shipment, $7; Sandia T-shirts and caps, $7; 16" x 20" aerial view of Labs, mounted, $20; Sandia Peak Patrol History, $10. South Highway 14 Village Project, LAB NEWS, Bldg. 814.

TRAVEL TRAILER, '83 Wilderness, 21', self-contained, rear twin beds, sleeps 6, AC, extras. Gonzales, 299-0288.

WATER PURIFIER, Watermate, filtration system, portable, electric, w/1-qt. container, white, $10. Barr, 821-5870.

SUPER-SINGLE WATER BED, w/frame, heater, headboard, and sheets, $50. Fitzgerald, 884-4607.

SATELLITE EQUIPMENT: 3 dishes, 3 LNAs, 3 antenna actuator systems, 6 receivers, everything for $1200 OBO. Beaudet, 299-0849.

TWIN BED and frame, $75. Mazze, 299-4568.

TRAVEL TRAILER, '86 model, 27', self-contained, AC, 2-way refrigerator, sleeps 6, includes sway bar, equalizer, and hitch, $7895. Vernon, 293-8197.

MOTOR OIL, 8 qts. Pennzoil, multi-viscosity 20W-50, 75 cents per quart or $5.50/all. Schkade, 292-5126.

OLYMPUS OM-G CAMERA plus 50mm lens and case, new, $200 OBO; Clarion AM/FM stereo car radio, small chassis, $25. Gottlieb, 298-9859.

TRAILER, '79 Prowler, 19', self-contained, tandem axle, sleeps 6, used 7 times. Heisler, 299-4385.

TWO BREAKFAST BAR CHAIRS, brown vinyl, w/rollers, $90/ea.; La-Z-Boy swivel rocker, brown velvet, $100; bumper pool table, $100. Paul, 299-6387.

UTILITY TRAILER, $100; rolltop desk w/chair, $200; crib, $60. Archuleta, 898-6203.

CANON FT CAMERA, w/55mm f1.2 lens, 100-200mm f5.6 zoom lens, Vivitar 28-85mm zoom, $225. Hurford, 898-5335.

TV SATELLITE DISH, Panasonic controller and power supply, remote controller, you move, $1000 OBO. Davis, 275-0779.

STUFFED FABRIC CATS, $35/large, $15/small; 2 twin-size comforters, $40/ea.; 2 shams, $5/ea. Johnson, 296-1917.

DINETTE TABLE, 48" x 35" w/12" leaf and 4 brown vinyl chairs, $160. Joseph, 299-6989.

FIBERGLASS HOT TUB, in-ground, 6' x 6', w/110-V pump, heater, and accessories, $500. Alderete, 294-7274.

TWO UNITED AIRLINES TICKETS, Albq. to Orlando, Fla.: 1 regular one-way, cost $380; 1 special fare, cost $240; sell for $100/ea. Bailey, 265-0975.

LOWREY MICRO GENIE KEYBOARD, model V120, full keyboard, 12 orchestral, 6 solo, 14 rhythm presets, accompaniment, memory, $500. Allen, 296-6453.

THREE METAL LATHES, 10" and 11" swing, $900 up; R. C. Gorman lithograph, appraised at $2350, will take $1700. Davie, 296-3950.

THREE-PIECE SECTIONAL COUCH, beige, $75. Garcia, 298-7340.

DRAPERY FOR 6' WIDE DOOR, w/valance, soft gold, $100; full-size sofa, 3-cushion, gold velvet, $175. Rainhart, 821-3690.

WATER BED, kitchen table w/chairs, Laser car mask, Subaru louver, Maytag dryer. Salgado, 291-9460.

AIR CONDITIONER, 1/3-hp electric motor, $10; tires and rims. Padilla, 877-2116.

PLAYPEN, $25; Graco baby walker, $25. Williams, 292-1210.

PIANO, upright Lexington, w/bench, $395. Coalson, 298-0061.

MULTIMETER, Fluke 27Y, military ruggedized model, $200. Scranton, 869-6589.

TI PROFESSIONAL PC, portable, 256KB, dual floppy, TI855 letter-quality printer; *Chemical Engineers Handbook*, Perry & Chilton, 5th edition; Ford shop manuals, 1970, $5; Kawasaki shop manual, '66-'77, free. Grafe, 291-9692.

TWO CERAMIC LIGHT FIXTURES, "Yankee Doodle" Indian design, collector's items, $200/ea. OBO. Bujewski, 291-9340.

LADY DEXTER BOWLING SHOES, size 7-1/2, new; Rosenthal table service for 12, 96 pieces, new. Wagner, 293-3211.

REMINGTON 700 BDL RIFLE, 30.06, w/Weaver Marksman 3X9 scope, best offer over $400. Castillo, 831-0580 or 242-9601.

BISSELL CARPET CLEANER, w/attachments, cost $169, sell for $75. Henry, 275-8583.

SINGLE BED, $125. Haynes, 296-4690.

PULMONARY EQUIPMENT, oxygen concentrator, nebulizer compressor, shoulder-type portable plus roll-around, $1500/cash; 2 crypts in Sunset Memorial mausoleum, "E" level, closing costs and printing included, $2400 cash. Kresge, 821-3933.

HOTPOINT REFRIGERATOR, top freezer, 20.7 cu. ft., harvest gold, 4 yrs. old, $375 OBO. Baca, 298-7748.

ECHO CHAIN SAW, Electrovoice speakers, corduroy ski suit, queen-size pine poster bed, full wet suit, sail cloth, best offers. Blake, 881-1663.

FIREPLACE, Majestic MBC-42, w/chimney, used one season, $400. McCartney, 281-1381.

CRYSTAL: 8 iced tea, 7 champagne/sherbet in Lenox "Invitational"; 8 Lennox rose-colored wine glasses, best offer. O'Bryant, 268-9049.

WAGNER POWER PAINT ROLLER, used twice, $50. Hall, 298-8617.

S&W S.S., model 657, .41-mag., 3" barrel, new in box, $295; AMT S.S. backup, .380-cal., new in box, $190. Greene, 299-4163.

LAWN MOWER, gas-powered, rear-bagger, $45. McCornack, 296-3936.

TRAVEL TRAILER, 21', '76 Nomad, AC, special model w/2 overhead bunks, sleeps 6-8. Beegle, 296-5300.

THICKNESS PLANER & MOLDER, Bel-Saw, 8", $350; shop vac, 8-gal., $25; 7-1/4" circular saw, heavy-duty. Denney, 268-0004.

FULL-SIZE MATTRESS AND BOX SPRING, Sealy Posturepedic, $175; Art Deco custom-made mirrors, $50. Tilgner, 821-7551.

SOFTWARE: Norton Utilities, Version 4.0, advanced edition, w/speed disk, unformatted, never opened, $65. Skogmo, 294-0133.

THREE TIRES, Goodyear vector radials, size P205 75R15, $30/ea. OBO. Dell, 291-0274.

CABOVER CAMPER, sleeps 4, icebox, stove, table, pair of jacks included, $600. Long, 296-2590.

TRASH COMPACTOR, GE Compactall, $100; bowling ball, case, men's size 8D shoes, $35. Reich, 821-5528.

GE STOVE TOP, 4 burners, 18-1/2" x 28", $35. Dalphin, 265-4029.

COUSTIC CAR 5-BAND GRAPHIC EQUALIZER, w/60-watt booster and LED spectrum analyzer, sells for $285, asking $150 OBO. Mora, 281-9815 evenings.

COLOR TV, 19", 105 cable-channel-ready, wireless remote control, 2 yrs. old, $200. Brewer, 831-5031.

BABY CRIB, wooden, includes sheets and bumper pad, $50 OBO. Lambert, 892-0541.

TRANSPORTATION

GLASSTRON I/O BOAT, less than 400 hrs., 130-hp, fiberglass hull, 16'10" long. Hall, 299-0009.

'60 FORD 1/2-ton pickup, good for parts, $65. Padilla, 877-2116.

YAMAHA 80cc MOTORCYCLE, 2 mirrors, deflector shield, $550. Johnston, 294-5179.

'79 FORD T-BIRD, one owner. Gallegos, 242-4797.

'78 NORDIC CRUISER, 20', 460 Ford engine, Dominator jet, both recently rebuilt, extras, $11,500 OBO. Miller, 281-3959.

'81 DODGE RAM PICKUP, 6-cyl., new tires, $2000 OBO. Sanchez, 864-9297.

10-SPD. BICYCLE, Raleigh Super Course, 23.5", Reynolds 531 frame, quick-release hubs, alloy rims, $100. Kaye, 929-4242 after 6.

'84 CAMARO, 37K miles, AC, AM/FM cassette, 5-spd., take over payments. Thomen, 296-9590 after 5.

'83 CITATION, loaded, extras, V-6, AT, one owner, 72K miles, $2900 OBO. Sturgeon, 281-9035.

'74 MGB GT, $2150 OBO. Palkovic, 292-5582.

'78 DODGE OMNI, 4-dr., AT, PS, AM/FM, used daily, dented rear fender, $925. Bundy, 821-1846.

TREK 1000 BICYCLE, 60cm, purchased February 1987. Fine, 268-4491.

'79 FORD F100 PICKUP, SWB, 6-cyl., 3-spd., new interior, seats, brakes, $2250. Schaub, 821-7242.

'84 NISSAN KING CAB 4x4, AC, PS, 5-spd., 41K miles, $6200 OBO. Stephenson, 281-5781.

'68 DODGE DART, 318 engine, PS, PB. Gabaldon, 266-0028.

'67 VW, converted to Baja Bug, make offer. Chu, 298-1073.

'84 HONDA ASPENCADE, 6K miles, w/all options, $4500; '85 VT1100C Shadow, 1K miles, $3000; CB200, $300. Gustke, 268-6580.

'79 CORVETTE L-82, 4-spd., 49K miles, $10,500 OBO. Fleming, 881-2223.

SCHWINN BICYCLE, boy's 10-spd., $50. Williams, 292-1210.

'72 CHRYSLER CORDOBA, $600. Pfeiffer, 299-3951.

'76 DODGE CRUISEMASTER RV, 27K miles, 19', sleeps 4, self-contained, make offer. Stimmell, 299-2972 after 9 or leave message.

'85 TOYOTA DOLPHIN MMH, 21', roof and dash air, stereo cassette, 9.9K miles, $16,900. Russell, 298-4949.

TWO COLUMBIA BICYCLES, 10-spd., $45/ea. or $80/both. Odinek, 892-5822.

'80 MGB, $3500; '86 KDX200, $1500. Pryor, 294-6980.

BOY'S BMX BIKE, 24", $45. Zoss, 822-0816.

'76 DATSUN PICKUP, long bed, $1250 OBO. Summers, 881-7765.

HOBIE 16' CATAMARAN, new sails, trailer, options, $2000. Ginn, 344-9467 or 265-4223.

BICYCLE, Centurion LeMans 12-spd., men's frame, 27" wheels. McCornack, 296-3936.

'69 MERCEDES 250, one owner, AC, 4-spd., light blue, service records available, $4000; Schwinn Collegiate bicycle, girl's 10-spd., 18" frame, $60. Edgerly, 898-2983.

'73 DODGE D100 CLUB CAB PICKUP, 360-CID, AT, PS, PB, AC, cruise, shell, extra tanks, sliding window, $1200 OBO. Skogmo, 294-0133.

'68 PONTIAC FIREBIRD CLASSIC, 39.2K miles, 350 V-8, AT, PS, PB, $4000 OBO. Zarick, 836-5703.

'76 OLDS CUTLASS S, 250 cu. in., 6-cyl., 43K miles, PS, AT, AC. Saviteer, 296-3750.

'78 COUGAR XR-7, AC, PS, PB, V-8, new transmission, $1500 OBO. Garcia, 293-2810 after 6.

'78 DODGE D200 PICKUP, 3/4-ton, crew cab, 6-1/2' bed, $1100. Woodrum, 892-7980.

'83 FORD F-150 PICKUP, FM tape, 6-cyl., AT, AC, PS, PB, $4200. Rea, 296-1588.

'72 VOLVO 144E, 4-dr. sedan, AT, $1025. Church, 299-2175.

REAL ESTATE

3-BDR. TOWNHOME, Ladera area, greatroom w/FP, clerestories, landscaped, deck, 2-car garage, 1267 sq. ft., $69,500. Harris, 836-2168.

LOT IN FOUR HILLS, $52,500. Padilla, 242-8763 or 345-7660.

4-BDR. MOSSMAN HOME, 2350 sq. ft., family room w/FP, solar greenhouse. Ezell, 821-1768.

LAKE RESORT HOUSE on Rio Grande near Elephant Butte, boat storage, $49,500; Cedar Crest country house w/guest house on 2 wooded acres, Hwy. 14 frontage, $112,000. Carson, 281-5115.

3-BDR. HOME, Bosque Farms, 2 baths, covered front porch, 14' x 50' passive solar sunroom/workshop, landscaped, on 1/2 acre, $61,500. Danclovic, 869-6086.

4-BDR. HOME, 1986 sq. ft., 1-3/4 baths, family room w/FP, Tramway and Indian School, $125,900. Yost, 298-4307.

2-BDR. TOWNHOUSE, 1-3/4 baths, single garage, auto sprinklers, fenced yard, convenient to downtown and I-40, $39,900. Schindwolf, 831-1940.

5.5 ACRES, Magic Valley subdivision, 30 mins. from Sandia, wooded, $65,000. McCornack, 296-3936.

4-BDR. BRICK HOME, Arroyo del Oso, pitched roof, cul-de-sac, mature landscaping, sprinklers, 2-1/2 baths, some passive solar, $127,900. Blackwell, 292-5362.

2-1/2 TO 10 ACRES, southeast of Albq., running stream, owner financing. Redlinger, 281-5783.

3-BDR. HOME, near KAFB and schools, $60,000. Floyd, 296-5062.

2.5-ACRE LOT, in Placitas Homestead, view, well. Koehler, 831-0362.

3-BDR. CUSTOM HOME, 1-3/4 baths, 1810 sq. ft., great room w/FP, views, Academy Hills, $112,500. Rutledge, 821-3048.

WANTED

ROUND REDWOOD OUTDOOR TABLE and round benches able to seat 4. Hovorka, 299-0224.

HOUSEMATE, female, non-smoker, to share 3-bdr. Taylor Ranch home, private bedroom w/bath, $275 plus utilities. Bassett, 898-1840.

SOMEONE TO HAUL misc. junk to the dump. Mosteller, 256-3227.

FRESH-WATER AQUARIUM w/all accessories, in working condition, prefer 10-gal. Williams, 292-1210.

HOUSEMATE, female, non-smoker, share 3-bdr. house near Morris and Constitution NE, $250 plus half utilities. Champion, 275-8531.

WORK WANTED

BABYSITTING and cleaning by 2 reliable 15- and 16-yr.-old girls, summer jobs and after school, references provided, love children. Thomen, 296-9590.

HOUSE-SITTING, 23-yr.-old male, UNM freshman, Coast Guard veteran, non-smoker, Aug. 1. Pyle-Fjelseth, 296-2257.

WINDOW WASHING by 2 responsible high school students, NE Heights area, $3/window for most windows. Zoss, 822-0816.

KIDSITTER, responsible 14-yr.-old, good with kids, to sit afternoons, evenings, weekends, Juan Tabo/Spain area, also care for plants and animals. Boles, 299-1697.

LOST AND FOUND

Lost: gold and turquoise tie tack, $50 reward. Cooper, 884-1363.

Declare Your Independence With Flags, Feast, Fun

FLAG WAVING'S DEFINITELY IN ORDER on Saturday as independent types gather for the big 4th of July blast at the pool/patio from 11 a.m. to 6 p.m. A BBQ buffet served from 11 to 5 features hamburgers, hot dogs, BBQ beef, potato salad, macaroni salad, and more. Fifty cents buys you a beer from either of the two bars set up on the patio. The Albuquerque Municipal Band provides stirring Stars-and-Stripes music from 11 until 2, when the Sounds Unlimited DJ takes over on the tunes. Celebrants get free flag pins and balloons. Since no 4th of July festivity is complete without fun and games, there'll be treasure dives for kids in different age groups, three-legged races (all ages), a pole-climbing contest, a visor dive for teens, and a Coke dive for adults; all sorts of prizes go to the winners. In between all these activities, plan to take a refreshing dip in the pool. In honor of the occasion, all Club members are admitted free, so bring the membership card. Guests of members pay $2 each.

GET A SUPER START on the holiday weekend tomorrow night with some sagebrush shuffling to the tunes of those good old Poor Boys from Isleta. They'll strum those c/w melodies from 8 p.m. to midnight. No Friday night dinner special because of facelift work in the kitchen, but manager Sal Salas promises munchies for all you shufflers from 6 to 9.

And, since you can never get too much of a good thing, the Poor Boys return on Friday, July 17, following the two-for-one special featuring filet mignon or fried shrimp. Mark your calendar.

CAN'T STAND THE HEAT? Get out of the kitchen; come out to family night at the pool next Wednesday (July 8) from 6 to 9 p.m. The snack bar and grill provide all kinds of goodies for your dining pleasure, and you can stay cool all evening with a swim from time to time. Regular pool/patio admission rates: free for pass holders, $1/person for Club members without passes, and $2 for guests.

More Seminars . . .

Looking for more ideas on investment opportunities? A couple of seminars next week may provide them. Make a note:

July 7 - Olde & Co. (Cathie Rush on self-directed IRAs through a discount broker), 5-6 p.m., Coronado room. More info from Cathie at 884-1800 between 8 a.m. and 4 p.m.

July 8 - Enstar Cable Television; Financial Network Corp. (Wesley Dobbs and Guy Trujillo on deregulation effects on cable TV and cable as an investment option), 5 p.m., Eldorado room. More info from Guy at 291-8585.

EVERYONE'S CELEBRATING the return of two-for-one dinner specials next Friday night (July 10). Entree selection that evening is first-class: prime rib or scallops, two dinners for the low, low price of $14.95. Reservations requested (265-6791). Latin music lovers will appreciate the special entertainment from 8 to 8:30 p.m. — a floor show by the Ballet Folklorico de Nuevo Mexico. This colorfully-costumed group performs a variety of native dances — ancient and modern — and is not to be missed. Afterward, the Freddie Chavez Foundation provides those sizzling sambas and rhythmic rhumbas for your dancing pleasure from 8:30 to 12:30. Olé!

IT'S A GOOD DEAL FOR GOOD SPORTS when the T-Bird card sharks get together for their action-packed shuffle sessions. You have two chanc-

"WE DON'T QUITE HAVE THE HANG OF IT YET," say Corby Pucket (left, daughter of Larry, 2854). She and Jill Williamson (Walt, 9144) are training for three-legged race competition so they can demonstrate their skill at the 4th of July celebration on Saturday.

es in July — on the 9th and 23rd — to get in on the fun; starting time for both is 10:30 a.m.

SPEAKING OF SPIRITED SPORTS, that always-ready-for-a-party Coronado Wolfpack plans another bash on July 11 — this time at the Downs at Santa Fe. Post time is 1:30 p.m.; this is one you fast-track types won't want to miss. For $15/person, you get reserved Jockey Club seating, racing programs and tip sheets, valet parking, and an elegant buffet; as for transportation to SF, you're on your own. To reserve your space, make sure Ed Brass (2000) has your check by tomorrow, July 3. More info from Ed on 4-2275 or 299-6016.

BRUNCH BUNCH BRIEF: Another of those famous Sunday brunches is set for July 12 from 10 a.m. to 2 p.m. The outstanding menu features baron of beef, fried chicken, western omelets, tossed salad, corn O'Brien, potatoes au gratin, pancakes, a fine dessert assortment, and a complimentary glass of wine or champagne. All that fine food goes for the bargain price of $5.95 for adults, $3 for children 4-12, free for kids under 4. Club members receive a $1/person discount, so don't forget the magic membership card. Reservations recommended.

THEY'RE NOT RETIRING, but they *have* retired. That up-front flock of Thunderbirds has another potluck shindig scheduled on Tuesday, July 14, starting at 4 p.m. Bring a main dish, salad, or dessert — and a buck, if you don't have a season patio pass. Supper's from 4 to 6, and Bob Banks provides music to put you in a mellow mood from 6 to 9.

Also, T-Birds: If you'd like to be limber, come on out for the monthly program on Monday, July 13, at 1 p.m. (south end of ballroom). Stan Ford, guru of the physical-fitness crowd and coordinator of SERP (Sandia Employees' Recreation Program), discusses SERP activities and possible programs of interest for Thunderbirds. Plan on lunch ahead of the program, and the T-Bird Board meeting right after Stan's presentation.

BLUES IN THE NIGHT? Never, if you sign up for one of those fantastic flings for which the C-Club Travel Committee is famous. Here's a sampling:

Ukulele Universe is where you're heading when you sign up for a super trip to Hawaii next fall (Oct. 30-Nov. 9). This one has it all: visits to three islands, first-class hotels, an authentic luau, all sorts of optional ground tours. The price of $989/person (double) covers RT air fare from Albuquerque; four nights' lodging in Oahu (Waikiki Beachcomber), three nights in Maui (Kaanapali Beach), and two nights in Kauai (Sheraton Coconut Palms), one night in L.A. on return (Hacienda Hotel); a rental car (per couple) on Kauai and Maui; and much, much more. Plan to attend a presentation on the Hawaii trip on July 8 at 7 p.m. in the C-Club dining room. You'll get all the details, plus info on ground tour options; door prizes, plus other surprises as well!

Klondike Kaleidoscope — And the picture changes every day on this blockbuster visit to Alaska in September. It's your option: land/cruise (Sept. 8-20) or cruise-only (Sept. 13-20). The land/cruise package ($2325/person, double occupancy) includes tours of Anchorage and Fairbanks, a visit to Denali National Park (Mt. McKinley's home), a ride on the McKinley Explorer train, and a stern-wheeler cruise on an inland waterway. On Sept. 13 cruise-only people join you for a one-week cruise aboard the *Regent Sea* along the spectacular Alaskan coastline; ports of call include Ketchikan, Juneau, Skagway, and Vancouver. Cruise-only cost is $1642. Prices include all transportation and transfers, baggage handling, all meals on the cruise, plus hotels and all of the above for land/cruise types. Better hurry on this one; final payment's due on July 20.

Adore Aspens? Especially in the fall? Then this one-day special (Sept. 26) is just for you. View those shimmering golden beauties as you ride the Cumbres-Toltec Railway between Chama and Antonito (Colo.). More details later.

FIRST-CLASS FLOOR SHOW featuring native dances by the Ballet Folklorico de Nuevo Mexico is part of the action next Friday night right after the two-for-one special. Other entertainment that night from the Freddie Chavez Foundation, known for its challenging cha-chas.